The Madras Agricultural Journal

Vol. XLI AUGUST 1954 No. 8

CONTENTS

| | Page |
|---|---|
| Editorial ... ... ... | 247 |
| *Original Articles:* | |
| 1. Groundnut Rotation Experiment ... ... by C. R. Seshadri, M. Bhavani Shanker Rao and N. Srinivasalu | 249 |
| Research Notes ... ... ... | 255 |
| Thirty-Seventh College Day & Conference ... | 256 |
| Extracts and Gleanings ... ... ... | 289 |
| Weather Review ... .... ... | 292 |
| Departmental Notifications ... ... | 293 |

# "Star" brand *means* bigger harvests for you- more food for India

## IT PAYS TO USE "STAR" BRAND 30 RANGE COMPOUNDS FOR ALL YOUR CROPPING NEEDS

*We recommend for Paddy:*

| | % ANALYSIS Nitrogen | Phos. Acid | Potash |
|---|---|---|---|
| N. P. K. Paddy Ploughing Mixture | 8 | 8 | 8 |
| Packing | 80 lb. New Sealed Gunnies | | |
| P. S. Fertiliser Mixture | 16 | 4 | Nil |
| Packing | 80 lb. New Sealed Gunnies | | |
| A. P. Special Fertiliser Mixture | 14 | 7 | Nil |
| Packing | 80 lb. New Sealed Gunnies | | |
| Improved A. P. Special Fertiliser Mixture | 10 | 10 | Nil |
| Packing | 80 lb. New Sealed Gunnies | | |

# INDO-AGRI LIMITED.

*Managing Agents:*

**SHAW WALLACE & COMPANY LIMITED,**

P. O. BOX 14, MADRAS.

*Guaranteed Analysis* *Free Scientific Advice.*

# The Madras Agricultural Journal

Vol. XLI August 1954 No. 8

## *Editorial*

**Thirty-Seventh College Day and Conference:** This annual function of the Madras Agricultural Students' Union was celebrated this year on the 18th to 22nd August, Sri M. Bhaktavatsalam, Minister for Agriculture, Madras State kindly presided over the deliberations on the 18th August. A large gathering of departmental officers, students and members of the public were present.

Sri R. Balasubramaniam, Principal of the College, welcomed the Minister, Sri N. L. Dutt and other distinguished visitors.' In welcoming them the Principal told the audience how the Minister was responsible for some of the recent important measures taken to improve agricultural conditions in this State. Sri Dutt, he stated, was known internationally through his researches in sugarcane and especially by the wonder cane C. O. 419 which had revolutionised the sugarcane growing in the State. The Secretary, Dr. A. M. Kulandai then read his report on the working of the Union during the year and stressed on the urgent need of increasing the membership of the Union to improve its financial position especially after the disassociation of the Andhra members and on the starting of the Andhra Agricultural Journal.

The President then distributed the prizes to the students who had come out successful in the 1953—54 examinations. Sri S. S. Nagarajan knocked away three prizes and Kumari M. Leela was awarded the prize for Chemistry. Sri S. Varadarajan was awarded the Ramasastrulu Munagala gold medal. Sri M. Bhatavatsalam then delivered his presidential address which is published elsewhere.

This was followed by the address by Sri N. L. Dutt inangurating the symposium on Recent Advances in Agriculture. Sri Dutt gave a very lucid and informative exposition on the recent trends in the breeding of sugarcane including the genetical, physiological, chemical and breeding aspects. The President then in the course of the concluding remark declared open the exhibition arranged for the occasion in several sections of the Institute.

The second session was held during the afternoon of the 18th when several papers contributed for the symposium were presented. Dr. K. C. Naik gave an interesting and thought-provoking introductory address on the highlights of recent advances in agriculture.

This was followed by a talk by Sri S. N. Venkataraman on Propaganda and Plant Protection. Not all the papers could be presented during this session due to want of time. A list of papers contributed is given elsewhere.

On the 19th forenoon was held the Annual Farmers' Day. Several local farmers, farm labourers and a number of departmental officers and other visitors were present, The Minister for Agriculture presided over the occasion. The entire proceedings was in the regional language in which a number of farmers took part. During this Conference the students of the Young Farmers' Agricultural Course were also present and took part in all the College Day Functions.

The forenoon of the 20th, was devoted to the Centenary Celebration of the Madras Herbarium. It was a unique occasion this year that the centenary celebrations coincided with the College Day and Conference, with Dr. A. Lakshmanaswami Mudaliar, Vice-Chancellor of the Madras University occupying the Chair. The function started with a welcome address by the Director of Agriculture, Madras, reading of the report and messages by Sri C. Rajasekhara Mudaliar, Systematic Botanist and Professor of Botany, Agricultural College, introductory speech by the Minister for Agriculture and address by the Chairman, Dr. A. L. Mudaliar. A vote of thanks was proposed by the Principal. An exhibition was arranged at the Madras Herbarium. This was formally opened by the Vice-Chancellor. The exhibition was a very interesting one portraying all the important features of a herbarium and the role it has to play in the economic aspects of botanical and other sciences. The Herbarium sheets exhibited included some collections made in 1797 and 1853 A. D. The exhibition drew a large number of visitors.

The Departmental Officers' Conference and the Scientific Workers' Conference were held on the afternoons of the 19th and 20th. Several important problems were discussed during the Departmental Officers' Conference and a number of interesting papers were presented for the Scientific Workers' Conference and gave rise to animated discussion.

On the 21st of August was held the College Day Sports and Tea. All the events were very keenly contested and the Director of Agriculture was kind enough to give away the prizes to the successful competitors. The championship cup was awarded to Sri M. Marappan student third B. Sc. (Ag.) class.

With the holding of the General Body Meeting of the Union on the 22nd forenoon the College Day functions came to a close.

# Groundnut Rotation Experiment *

*by*

C. R. SESHADRI, M. BHAVANI SHANKER RAO

AND

N. SRINIVASALU

**Oil Seeds Section, Agricultural Research Institute, Coimbatore**

**Introduction:** The importance of rotation in crop production is well recognised. But this practice is not widely adopted in the Madras State probably due to the small size of the average holding of the cultivator. Groundnut being an important money crop of the drylands, is being grown year after year in the same land without any rotation. Judging from the present methods of harvest of the crop whereby the vines and some portion of the roots are removed from the soil, the practice of growing groundnut continuously in the same land is likely to have adverse effects though not immediately atleast in the course of some years. Where rotation is practised, it has been the experience of cultivators that crops following groundnut generally yield well. The spreading type of groundnut which is grown in rotation with *Varagu (Paspalum scrobiculatum)* by a few cultivators in South Arcot district is said to yield better than the same type of groundnut grown year after year without rotation. Rotations vary in the different producing areas depending upon a number of factors, such as, nature of soil, local conditions and demand, solvency of the cultivator, etc. In this State groundnut is generally rotated with cereals like *Cumbu (Pennisetum typhoides)*, *Cholam (Sorghum vulgare)*, *Varagu* and *Tenai (Setaria italica)* in dry lands. In favourable situations groundnut is followed in the same year by maize, *Varagu, Cholam,* cotton, gingelly and horsegram.

With the object of studying the effect of growing 1. groundnut on the succeeding crop of cereals like *Cholam, Cumbu* and *Varagu,* 2. cereals on the succeeding crop of groundnut and 3. which of the rotations is remunerative to the cultivator, the rotation experiment with groundnut was started at the Agricultural Research Station, Tindivanam in 1945 and is being continued. The experiment was carried out during the monsoon under rainfed conditions each year. The soil on which it is being conducted is light red sandy loam and is representative of the large portion of the dryland area of South Arcot and other neighbouring districts. The experi-

* Presented before the 11th Meeting of the Study Group Agricultural Research Institute, Coimbatore; March 1952.

ment has now been in progress for seven years ending 1951. The data relating to the first six years of the experiment and the results obtained therefrom are presented in this paper.

**Review of Previous Work:** A trial on the continuous growing of groundnut with and without manuring carried out for seven years at the old Palakuppam (near Tindivanam) Farm has shown that continuous cropping of groundnut without manuring reduces the yield (22 percent) and that to a marked extent in years of low and badly distributed rainfall (1935). Similar result was obtained at the Palur Farm where continuous growing of groundnut without rotation reduced its yield (1922). The beneficial effects of raising crops in rotation with groundnut have been reported by different workers. At the Hebbal Farm in Mysore, the yield of *Ragi* has been increased by 27 percent by growing it in rotation with groundnut (1930). Experiments conducted in black cotton soil of Berar have shown that growing cotton after groundnut resulted in 135 percent increase in its yield as compared with that grown continuously without rotation (1933). In Malaya, paddy grown after a groundnut crop recorded an increased yield of 24 percent over paddy grown after paddy (1950). In the experiment conducted at the Agricultural Research Station, Nandyal for six years to study the effect of different rotations on the main crop of the locality, viz., cotton, *Cholam* and groundnut, it was found that *Cholam* followed by groundnut gave the highest yield in grain and straw and that the effect of rotation on the yield of groundnut was negligible. Based on the results of the experiment, a three course rotation of *Cholam* groundnut and cotton is recommended for the tract in preference to the time honoured rotation of cotton and *Cholam*.

**Experimental Details:** The experiment consisted of the following eleven treatments :—

Groundnut after groundnut
Groundnut after *Cholam*
Groundnut after *Cumbu*
Groundnut after *Varagu*
*Cholam* after groundnut
Groundnut in the first season followed by gingelly in the second season of the same year.
*Cumbu* after groundnut
*Varagu* after groundnut
*Cholam* after *Cholam*
*Varagu* after *Varagu*
*Cumbu* after *Cumbu*

The last treatment was included in this trial as it forms one of the common rotations practised by the dryland cultivator of the tract where the Agricultural Research Station, Tindivanam is located.

Two series of experiments one with the short duration bunch type and the other with the long duration spreading type of groundnut are being conducted. The simple randomised blocks layout with four replications is being adopted. The size of the plots is 68′ x 13′ (gross) and 60′ x 6′ or 1/121 acre (net). TMV 2 bunch strain of groundnut is sown to a spacing of 6″ x 6″ while TMV. 3. spreading strain of groundnut is sown to a spacing of 9″ x 9″. The local varieties of the three cereals are sown in lines 1′ apart with plants spaced 6″ in the row. TMV. 1. strain of gingelly is sown

broadcast and the plants subsequently thinned to a spacing of about 9″ between plant and plant.

**Data collected**: During the crop season, notes on the effects of the season, on growth, flowering and fruiting, incidence of pests and diseases, etc., are taken. Details of labour employed for the various field operations are recorded throughout the crop season as and when they are carried out. At harvest time the yield of grain and straw are recorded for each of the crops and for the individual plots. For purposes of comparison of yields, only the produce obtained from the net size of plots is utilised.

**Discussions**: (a) *Seasons:* During the period this experiment has been in progress, the seasonal conditions have not been normal. Under these conditions yield of the crops was not quite satisfactory. Among the two groundnut types, the long duration spreading type suffered more on account of the failure of the north-east monsoon during the last three years. The cereals were affected to a greater extent than groundnut. For want of rains, the sowing of the second crop of gingelly could not be done in the 'groundnut gingelly' plots during the last three years.

(b) *Yields:* The yield of the groundnut crop following other crops was compared with the yield of groundnut grown continuously year after year. Similarly, the yield of cereals grown after groundnut was compared with the yield obtained from their continuous cropping. Though the yield data of the six seasons are available yet the figures of the first year have been left out as it happens to be the basic year when no comparison between the treatments is possible. Hence only data of the remaining five seasons have been actually utilised for comparison of the different sets of treatments. A summary of the analyses of the yield data is presented in Table I.

In the bunch series, groundnut following cereals has given small increases in yield varying from 4·5 percent to 12·0 percent. But in the spreading series only groundnut following *Cumbu* has recorded an increase of 5·5 percent. Groundnut after *Cholam* and after 'groundnut - gingelly' has actually suffered certain reduction in yield in the latter series. But all these differences are not statistically significant. The experience of South Arcot cultivators of the groundnut crop giving increased yield when it follows a *Varagu* crop is not borne but by the data obtained in this experiment.

TABLE I

| Treatments | Bunch Series: Acre yield in lb. | Bunch Series: Percentage over control | Bunch Series: Significance of treatment differences (5% level) | Spreading Series: Acre yield in lb. | Spreading Series: Percentage over control | Spreading Series: Significance of treatment difference (5% level) |
|---|---|---|---|---|---|---|
| **(a) Yield of the groundnut crops (Average of five years)** | | | | | | |
| Groundnut after groundnut | 884 | 100·0 | — | 843 | 100·0 | — |
| Groundnut after *Cholam* | 983 | 112·0 | Not Significant | 770 | 91·3 | Not Significant |
| Groundnut after *Cumbu* | 959 | 109·2 | — | 890 | 105·5 | — |
| Groundnut after *Varagu* | 935 | 106·5 | — | 849 | 100·7 | — |
| Groundnut after groundnut gingelly | 917 | 104·5 | — | 812 | 96·3 | — |
| **(b) Yield of Cereals (Average of five years)** | | | | | | |
| *Cholam* after *Cholam* | 327 | 100·0 | Significant | 426 | 100·0 | Significant |
| *Cholam* after groundnut | 732 | 223·8 | — | 714 | 167·6 | — |
| *Cumbu* after *Cumbu* | 282 | 100·0 | Significant | 268 | 100·0 | Significant |
| *Cumbu* after Groundnut | 402 | 142·6 | — | 433 | 161·0 | — |
| *Cumbu* after groundnut | 402 | 142·6 | — | 433 | 161·0 | — |
| *Varagu* after *Varagu* | 223 | 100·0 | Significant | 436 | 100·0 | Not Significant |
| *Varagu* after groundnut | 484 | 217·0 | — | 460 | 103·1 | — |

When the yields of cereals after groundnut are compared with cereals following cereals, the results are striking. The cereals after groundnut have recorded outstanding increase in yield of 43 percent to 124 percent over cereals which are grown year after year without rotation. These increases in yield are significant excepting in the spreading series where *Varagu* follows groundnut. This may probably be due to the poor stand observed in *Varagu* plots in certain seasons. This, however, requires further confirmation. From the above results it is evident that cereals grown in rotation with groundnut are greatly benefitted and give marked increase in yields over cereals after cereals. Of the three cereals, *Cholam* seems to derive maximum benefit by being grown after groundnut.

**Economics:** The cost of cultivation and the value of produce obtained for each of the crops were worked out each year and the

average net profit or loss per acre in rupees for each of the crops is given in the table below:

**TABLE II**

**Groundnut Rotation Experiment—Economics of Cultivation**
(Average of six years—five comparisons)

| Treatments | | Bunch Series | Spreading Series |
|---|---|---|---|
| **(a) Single Crops** | | | |
| Groundnut after groundnut | .. | 82 | 73 |
| Groundnut after *Cholam* | .. | 107 | 60 |
| Groundnut after *Cumbu* | .. | 102 | 86 |
| Groundnut after *Varagu* | .. | 96 | 75 |
| **(b) Comparison of the Rotations** | | | |
| *Cholam* after *Cholam* | .. | 28 | 13 |
| *Cholam* after groundnut | .. | 123 | 78 |
| *Cumbu* after *Cumbu* | .. | 33 | 37 |
| *Cumbu* after groundnut | .. | 83 | 71 |
| *Varagu* after *Varagu* | .. | 46 | 13 |
| *Varagu* after groundnut | .. | 81 | 63 |

Groundnut cultivation under the different systems of cropping has resulted in a fair margin of profit ranging from Rs. 60/- to Rs. 107/- per acre. The bunch groundnut following cereals has given a better return than the same type of groundnut grown year after year. Similar profit in the case of the spreading type has been obtained only when it follows a *Cumbu* crop. In the case of cereals, only *Cholam* following groundnut has registered a small profit. In all other cases, their cultivation has resulted in loss. This is due to the low yield obtained and to the valuation of their produce at controlled rates. When the rotations are compared with cereals following cereals the latter have resulted in loss while those following groundnut have recorded substantial profits. Maximum profit has been registered for 'groundnut—*Cholam*' rotation in both the serves.

**Conclusion**: From the results of the analyses of the yield data relating to the experiment it is clear, that cereals following groundnut give comparatively high yields than cereals following cereals. The groundnut crop on the other hand does not seem to benefit to any appreciable extent by its being grown in rotation with the cereals. Groundnut cultivation has resulted in good monetary returns on

account of its high market value. The bunch groundnut following cereals has given better return than the same type grown year after year. Growing of cereals has generally resulted in loss excepting in the case of *Cholam* grown after groundnut. Considering the economics of the different rotations 'groundnut—*Cholam*' rotation appears to be the most profitable one for tracts where the bunch type of groundnut is largely grown.

## LIST OF REFERENCES

Badami, V. K. 1930 Groundnut in Mysore. J. of the Mysore Agric. Expt. Union Vol. 11 No. 3 Pp. 113—139.

Harkey, C. W. S. & O. S. Keeping 1950 Experiments on the cultivation of Groundnuts. Malayan Agric. J. Vol. 33 Pp. 33—37.

Kulandaiswami Pillai, N. S. & Avudainayakam Pillai, K. 1922 Cereal—Groundnut rotation experiment Madras Agric. Dept. Year Book.

Mahta, D. N. & Janoria, D. L. 1933 Groundnut as a rotation crop with cotton. Indian J. Agric. Sci. Vol. 3 Pp. 917—932.

Madras Agri. Station Rept. 1934—35 P. 212
1945—46 P. 67—68
1947—48 P. 558

## SNIPPETS

"My wife has been using a fat-reducing roller for nearly two months now".

"Yes, and can you see any results"?

"Sure, the roller is much thinner".

**Research Note.**

# Tests with Different Proportions of Zinc Phosphide Poison in the Baits used for the Field Rat— *Bandicota Bengalensis* G and K

For the control of the field rats in paddy fields, zinc phosphide at 5% level was recommended to be used in the baits. Experiments were carried out to minimise the dosage of zinc phosphide in the bait in Krishna and Guntur districts during 1949, for the efficient control of field rats. Accordingly baiting in the form of cooked rice containing 1, 2, 3, 4 and 5% of zinc phosphide were tried and relative mortalities of rats in different doses were recorded. The results indicated that 2% zinc phosphide was found quite satisfactory in controlling rats. The Food and Agricultural Organisation Conference Proceedings held at London in 1947 on 'preservation of grains in storage' have also recommended the use of zinc phosphide in 2·5% proportion with wet baits and our conclusion that zinc phosphide is best used at 2% proportion in cooked rice confirms the findings. The incorporation of fried onions to zinc phosphide at 2% strength added to the efficiency of the bait. However, when 5% baits were used, the mortality occurred within 3 to 5 hours whereas at 2% level it was delayed up to 12 hours. The lower percentage has the advantage of making the baits more acceptable to the rodents besides reducing the cost per acre of the control measure.

In Tanjore district, popped rice containing 5% zinc phosphide was being used for baiting against rats. Experiments were consequently undertaken at Aduthurai with caged rats of similar size during November 1952 using zinc phosphide ranging from 1 to 5% in the poison bait (popped rice + fried onions + fish bits + zinc phosphide). The findings of the experiment are that even with popped rice, zinc phosphide is best used at 2% proportion to reduce the cost of baiting and increase its acceptability. The rats were found dead within a period of 10 hours with 2% zinc phosphide baits. This change in baiting which was given effect to from December 1952 at the Agricultural Research Station, Aduturai, has given satisfactory results so far and it may be adopted in baiting for rats by anybody now.

Entomology Section,
Agrl. College & Res. Ins.,
Coimbatore.

V. TIRUMAL RAO,
T. SANTHANARAMAN,
K. R. MOHAN RAO.

# THIRTY-SEVENTH COLLEGE DAY & CONFERENCE

★

## Welcome Address by the Principal

*Hon'ble Minister for Agriculture, Madras, Sri N. L. Dutt, Ladies and Gentlemen,*

It is my proud privilege and honour as the Principal of the Agricultural College and Research Institute, Coimbatore and President of the Madras Agricultural Students' Union to accord a hearty welcome to all those assembled here on the occasion of the thirty-seventh College Day and Conference. The Union is indeed very fortunate to secure the presence of Sri M. Bhaktavatsalam, Minister for Agriculture, Madras for presiding over the proceedings of the Conference. It is a gesture which we greatly appreciate. Although he has been in charge of the portfolio of Agriculture from the time of partition of the State, he has taken such an abiding interest in matters relating to Agricultural Research, Extension and Education, that evidence of his personal direction is apparent in the enumeration of new policies for increasing production and in the expansion of Agricultural Education.

The Union is equally indebted to Sri N. L. Dutt for having accepted to inaugurate the conference and to preside over the symposium on 'Recent Advances in Agriculture' chosen as subject of this year's conference. His work on sugarcane is in keeping with the best traditions of the section which has contributed not a little to the development of Sugar Industry of India. Being the Head of our neighbouring sister Instistute, he is already well known in scientific world of the Indian Union and I am sure that as Chairman of the symposium, he will bring his ripe experience and wisdom in guiding the deliberations.

The Agricultural Education in Madras continues to attract young men desirous of making agriculture their profession or a means of service. Sixty one out of 76 students who appeared for the final examination in B. Sc. (Ag.) held in April 1954 came out successful. All the fifty seven graduates belonging to the Madras State were appointed in the existing vacancies of the Department. The admission to the First year B. Sc. (Ag.) class of 1954-'55 was raised from 96 to 108 on account of the loss of seats reserved for Madras candidates at the Agricultural College, Bapatla after the partition. The number of applications received for admission during the year was appreciably larger than the previous years. All the 108 seats were filled up. One notable feature of the year was the desire of educated youth drawn from farming communities owning large extent of lands to take up agricultural education with a view to go back to their

farms at the end of the course. It is a change which is to be welcomed and fostered. The rules and syllabus relating to the six months practical training for the B. Sc. (Ag.) under revised regulations were adopted by the Madras University and Government. The students who were admitted in the academic year 1953-'54 would be the first batch to benefit by the training.

The first Post graduate Diploma course in Horticulture affiliated to the University of Madras was commenced at Coimbatore on the 14th August 1953 with a complement of 25 trainees, of whom twelve and eight were selected from the upper subordinates of Madras and Andhra States respectively, one nominee was from the Hyderabad State and four others were private candidates.

The Government sanctioned a scheme for running a Refresher course in Agriculture for young farmers for a period of six months in order to give an all round practical training in Agriculture and allied subjects to the farmers within the age group af 17 to 25 years. The first year course was run from July to December 1953 at the Central Farm. Fourteen trainees consisting of eleven Tamil and three other Malayalee farmers transferred from Taliparamba centre during September 1953 underwent training in the regional Tamil language under an Agricultural Instructor specially appointed for this course. The trainees secured the full benefit of instruction and went back to their lands. The facilities have been extended during this year too and 27 young men have joined and are undergoing the course.

In congratulating the various prize winners of the year, I exhort them to contribute their best in the field of extension or research, whichever may be their allotted lot while in service in the department. It is creditable that the students of the year have been able to make a mark in the field of sports, art, debates and literary activities. This year's Tatler is a glorious achievement both in matter and get up. It has evoked appreciation from all educational institutions.

The Union continued to strive its utmost to disseminate scientific knowledge through its journal published monthly in spite of bottlenecks in finance especially after partition. I appeal to brother officers to make liberal donations even at some personal sacrifice and sustain the spirit of service behind the publication of the journal.

I also take this opportunity to extend a very cordial welcome to various officers of the department, members of the public, students, farmers and others assembled here.

## Report of the Secretary of the M. A. S. Union

*Ladies and Gentlemen,*

On behalf of the Madras Agricultural Students' Union I extend a hearty welcome to you all and have great pleasure in presenting to you the report for the year 1953—'54.

The Union is extremely fortunate in being able to secure the presence of Sri M. Bhaktavatsalam, Minister for Agriculture to the Government of Madras, to inaugurate the deliberations of this Conference this year. When he accepted our invitation at great personal inconvenience and amidst his multifarious duties that devolve on the ministerial chair which he occupies, we fully realise that thereby he has shown his keen interest and enthusiasm in matters relating to Agricultural development. He has been known as a patriot of the front rank, who has set his heart to the improvement of this State and the State is fortunate in having him at the helm of affairs in the Development of Agriculture. The implementation of the National Extension Service Scheme in Tanjore district, with its aim "to organise the Villages for a happier, more prosperous and fuller life in which the individual Villager will have the opportunity to develop both as an individual and as a unit of a well integrated Society", is in no small measure due to the energy and enthusiasm of our Minister and the success which is bound to ensue, will be a monument to his efforts. On behalf of the Union please permit me, Sir, to offer our thanks for the readiness with which you have consented to accede to our request to inaugurate the deliberations of this year's Conference.

It is also our proud privilege to have on this occasion Sri N. L. Dutt, Director of the Central Sugarcane Institute to address us to-day. He is a worthy successor to the eminent Sugarcane Scientist Dr. T. S. Venkataraman, who addressed this Conference last year. We have great pleasure in welcoming him. His reputation as a Scientist is known far and wide. But his association with the Union and his keen interest in its very many activities and its progress may not be so well known. He has always evinced a sustained interest in our Union, of which he has been a member for many years, and has functioned in various capacities in its multifarious activities and to-day, in spite of his many onerous duties and responsibilities of running a great Institute, he has graciously consented to be present on this occasion and to preside over its deliberations. For all this, the Union owes him a deep debt of gratitude.

**The Madras Agricultural Students' Union:** The Union was founded by a handful of enthusiastic workers in the year 1911 with the objective of bringing together the past and present Students of the Agricultural College, Coimbatore. With the formation of the Agricultural College at

Bapatla the Students of that College also joined and strengthened the Union until recently. The Union has been flourishing as an independent and voluntary organisation serving as a link between the past and the present Students of the two Colleges. The Union can also proudly state that through the medium of its Journal it disseminates knowledge and information on Agricultural matters of the State to the public and to the departmental members and acts as an important link between the research worker and the farmer.

**The Andhra Agricultural Journal**: With the partition of the State during the year many of our members were transferred to the Andhra State and it is gratifying to note that they lost no time in starting a Journal of their own, viz., "The Andhra Agricultural Journal." We wish our contemporary a long and useful career in the cause of the common ideal, namely, the development of Agriculture in the Country.

**The Madras Agricultural Journal**: Despite the fact that there was a fall in the strength of members due to partition of the State, the Journal has been published regularly throughout the year and we are proud to note that research workers in other Institutions and Departments have recognised its place among the scientific publications of the world. The Journal has acquired an international reputation and is on the exchange list of a large number of Scientific publications of India and Abroad.

**Finance**: The most important activity of the Union is the publication of the Journal. Financial resources is the bottle-neck which is limiting its expansion. A big slice of the budget is spent towards meeting the cost of paper and printing charges. With none too bright a financial position before, and the discontinuance of membership of a large number of erstwhile Andhra members, the Union is now facing hard days. In this connection the Union desires to express and place on record its deep sense of gratitude to the Government of Madras for the special grant of Rs. 1,800/- sanctioned annually since 1947—'48. We take this opportunity to make an earnest appeal to all the past and present students of this College, the officers of the Department and the farmers who are not yet members of the Union, to enroll themselves as members and strengthen the Union so that it may function, flourish and continue its activities. We also appeal to all our members to enlist as many new subscribers as possible, thereby helping the Union to sustain itself during the years to come.

**College Day and Conference, 1953**: The celebration of the College Day and Conference is an annual feature of the activities of the Union. The Thirty-sixth College Day and Conference was celebrated last year from the 17th to 20th of August. The Conference was inaugurated by Dr. Punjabrao Deshmukh, Union Minister for Agriculture. The Presidential address was delivered by Dr. T. S. Venkataraman, retired Sugarcane Expert and the subsequent sessions were presided over by

Sri M. S. Sivaraman, I. C. S., Director of Agriculture of our State. A symposium on "The Agricultural Department and its contribution to the Agricultural prosperity of the Madras State" was organised and it provided ample scope for discussion in which a number of Departmental officers and non-official visitors participated. An account of the proceedings of the College Day and Conference was published in the August issue of the Madras Agricultural Journal.

**Meetings Under the Auspices of the Union**: During the year the following three lectures were arranged under the auspices of the Union.

(1) "Japan and Japanese Agriculture" by Sri M. B. V. Narasinga Rao, Paddy Specialist, Andhra State.

(2) "Recent trends in Plant Pathology" by Professor T. S. Sadasivam, Director, University Botany Laboratory, Madras.

(3) "Life with the Farmers of America" by Sri N. K. Natarajan, Ford Foundation Farmer-scholar.

**Ramasastrulu Munagala Prize**: The paper on "Enzymatic Studies of Aspergillus oryzae" was adjudged the best by a panel of three judges and the award was made to Sri S. Varadarajan of the Chemistry Section. Our thanks are due to Dr. G. S. Siddappa, Dr. P. Satyanarayana and Dr. S. Krishnamurthy for very kindly acting as judges for this year's competition.

A silver medal was this year presented by Sri K. Venkitaswami Naidu for second best essay. This was awarded to S. Venkatachalam of the chemistry section.

**Patrons**: We are glad to report that during the year two gentlemen were added to our list of patrons and the Union extends its hearty welcome to Sri N. S. Vaidyanatha Iyer of Sengalipuram and Sri K. P. Amirthanatha Iyer of Monkombu, our new patrons.

**Retirement**: During the year three of our active members of the Union retired from Government service. They are Sri M. R. Balakrishnan, Sri V. Gomathinayagam Pillai and Sri G. Sakharama Rao. Sri M. R. Balakrishnan has served the Union in various capacities and tended and nurtured it during its difficult times. Though he has retired from service he continues to be a member of the Union and is at the present moment its Vice-President. Sri V. Gomathinayagam Pillai has also rendered service to the Union in various capacities during the earlier years of his career. Sri G. Sakharama Rao has been associated with the Union as its member for a very long time. The Union offers its felicitations to them for their valuable services in various capacities and as members of the Union.

**Obituary**: The Union records with a deep sense of sorrow, the demise of the following members who were associated with the Journal

and the Union for a long time. They are the late P. D. Karunakar, K. Ramanujachari and S. Sundararama Iyer. Late S. Sundararama Iyer and P. D. Karunakar were Ex-Officio Presidents for some time and were also Editors and had served in several other capacities for the betterment of the Union.

**Acknowledgment:** Lastly, it is my pleasant duty to express on behalf of the Union our heartfelt thanks to all those who have helped the Union during the year in various capacities. To Dr. Punjabarao Deshmukh, the Union owes a great debt of gratitude for inaugurating the last year's Conference. To Dr. T. S. Venkataraman, who presided over the symposium and delivered the address, the Union tenders its heartfelt thanks. To Dr. R. Naganna Gowd, who made the welcome speech on the occasion of the last year's deliberations, the Union is highly grateful. To Sri M. S. Sivaraman, I. C. S., Director of Agriculture, Madras, the Managing Committee is highly indebted for his never failing help and guidance offered so liberally. To Sri R. Balasubramaniam, Principal of the Agricultural College and Research Institute, Coimbatore, for his valuable advice, help and interest in making last year's College Day and Conference a grand success, the Union expresses its thanks. Our thanks are also due to all the ladies and gentlemen who helped the Union in many ways to successfully conduct the College Day and Conference in 1953 and during the year under report.

***A. Mariakulandai,***
*Secretary.*

## President's Opening Speech by Sri M. Bhaktavatsalam, Minister for Agriculture, Madras

*Ladies and Gentlemen,*

I have very great pleasure in inaugurating the 37th Agricultural College Day and Conference. This is an occasion which provides not only an opportunity for practical farmers and non-officials interested in Agriculture to mix with students of Agriculture and officers of the Agricultural Department but also a valuable forum for the latter to exchange opinions and experiences among themselves. This year's Conference is unique in that it synchronises with the completion of 100 years of useful existence of the Madras State Herbarium which is located in the College.

Inaugurating the College Day and Conference last year, Dr. Panjab Rao Deshmukh, the Union Minister for Agriculture stressed the need for farmers organising themselves, as such organisations were conducive not only to development of agriculture and greater production but also tended to ensure the social and political solidarity of the country. This suggestion is taking shape and the Government of India are taking

steps to convene an All India Conference of Farmers at an early date. I attended a preliminary meeting to discuss this question which was held at Srinagar last month. I hope that an All India organisation of farmers will come into being ere long. I also hope that there will be the closest co-operation between the State organisation of farmers and the Madras Agricultural Students' Union for their mutual benefit.

In his welcome address, the Principal has given a summary of the varied activities in agricultural education in this State at present. I should like particularly to invite the attention of this gathering to the increasing stress that is now being laid by the Government on making agricultural courses both in this College and outside more practical. The University of Madras has whole heartedly agreed to the suggestion to institute a six months' practical training for the B. Sc. (Ag.) students to be imparted in the various Agricultural Research Stations of this State. When this intensive practical course is imparted, supplementing the theoretical-cum-practical course of instruction at this Agricultural College and in the Farms attached to this Institute, we shall no longer, I hope, hear the remark that is being often made, that the Agricultural graduates turned out by this College are not necessarily cent per cent practical farmers. Alongside this change in the curriculam of this College, the Government have also forseen the need for training the young farmers, for whose benefit a refresher course in Agriculture is being run since last year for a period of six months at this Institute. All these are in addition to the facilities for training in agricultural practice, that are made available by the Government at all the Agricultural Research Stations. With all these varied opportunities available for getting training in modern scientific methods of agriculture, if the public are not making full use of them, the reason may perhaps be that with the agriculturist, tradition dies hard. It is for the Madras Agricultural Students' Union to spread their message more and more to the youth among the farming community and thus kindle in them the desire and keenness to profit by the knowledge that the Department is waiting to impart to them. Quite apart from the education of the farming community and the graduates in agriculture, the Department has felt the need for a different type of training to promote the efficiency of the research work. You are all well aware that in these days the march of science is so rapid that unless the research workers and scientific men can keep step with this progress, they will soon be left behind as back numbers. It is inconceivable that a research worker can maintain the keen edge of his efficiency by merely banking on the education received at his College or on the knowledge acquired prior to his entering the service. The provision for a constant ingress of new ideas and fresh knowledge of up-to-date technique evolved in all parts of the world, is the only means of maintaining the efficiency of our research organisation at the top level. All this would mean the institution of a comprehensive post-graduate research training system.

Here too, the University of Madras have recently recognised Coimbatore as the Centre for post-graduate courses leading to the Degrees of M. Sc., and Ph., D. It is hoped all these facilities will be availed of to the maximum extent possible. In this connection I would like to make a suggestion. Provision may perhaps be made for students to obtain the M. Sc. degree in Agriculture by examination also at the Agricultural College."

The Minister then stressed the need to begin the agricultural education even from High School standards so as to create an agricultural bias in them. Already 13 schools with a total of nearly 1000 pupils are following this altered curriculam in this State. In the current year he said 25 more schools would be coming under this curriculam.

Referring to the exhibition put up at the Agricultural Research Institute he said that the exhibition may, if possible, be made to cover allied matters such as poultry breeding, farm animals and pisciculture and also for the display of agro-industrial products made in the home and cottage. The exhibition can also be made more popular by instituting a prize for plants and flowers collected and pets kept by school children. Thus opportunity may be taken to inculcate in the young mind the love of plants, flowers and birds that they see around them. He also suggested that the staff of the college may exhibit vegetables etc. grown by themselves in order to make the exhibition really practical and attract the attention of the lay public and also to provide the answer to the oft-repeated charge that the Departmental staff are not practical farmers.

After a long period of difficulties through which our State passed in the matter of food production, Nature has been bountiful to us now, and we have almost turned the corner. Our problem in the State, in so far as the food front is concerned, is to step up the yield from the available area to meet the cereal needs of the growing population. The use of improved seeds evolved by the Agricultural Department, adequate manuring, proper cultivation practices and protection of plants from pests and diseases, are the planks adopted towards this all-important objective. It is really a problem as to why, inspite of there being hundreds of improved strains of the various crops in the State, the ryots have not fully taken to the use of improved seeds, of the superior departmental strains. Similarly, the question arises as to why if a particular manure or an agricultural practice is found to be the best, still it is not adopted whole-heartedly or fully by all the ryots. Again, the drive given by the Department to increase the production of green manure crops through the simplest and most inexpensive methods remain also yet to be adopted throughout the length and breadth of this State. Recently, in order to infuse greater confidence among the public in the work of the Agricultural Department and to dis-abuse the general feeling among the public that the Agricultural Research Stations of the Government are run at a loss, a drive has been launched, the result of which

is that, despite the fact that these Stations are intended solely for pursuing research and have to be maintained at a certain standard, it has now been proved that they can be run on a self-sufficient basis also, if not on a profitable basis. The success of this drive is reflected in the fact that the total expenditure on 24 Agricultural Research Stations was brought down from Rs. 6·13 lakhs in 1951—'52 to 5·58 lakhs in 1953—'54, while the receipts have been stepped up from 3·50 lakhs to 5·76 lakhs respectively. This saving would not be worthwhile if the main function of research is given up but if self-financing is achieved without sacrificing research, these Stations would be doubly useful as research centres as well as model farms. Besides these Stations, something more has to be done to spread the improvements and messages of the Agricultural Department most speedily and effectively. It is here that the Community Project areas and the National Extension Service Blocks come into the picture. The all-embracing activities of these well planned and co-ordidated organisations, representing a nationwide drive, are expected to bring the message of scientific agriculture to the very door of the cultivator. The Madras Agricultural Students' Union as well as the farmers who have assembled to-day in this Conference could well deem it an act of service to the State by participating with all enthusiasm in this nation-wide drive for the regeneration or amelioration of our Agriculture."

The Minister then referred to the Improved Japanese method of paddy cultivation and the campaign launched last year. A modified method of cultivation based on the above is now being extended to millets and cotton. He appealed to the Farmers to fully co-operate in this drive to increase production of food etc.

"I have one word more to say. Agriculture is a vast science. Nay, it is an art. No one can claim to take credit of having served agriculture by concentrating on just a few of its aspects. An integral concept, with thorough devotion to fundamentals of theory and practice is necessary. Further, a sense of team work, co-operation and intellectual honesty alone will be productive of practical results. May you, as members or prospective members of this scientific and Nation-building profession in a Welfare State keep these ideals in view, ever and always.

It is now my pleasant duty to request Sri Nanda Lall Dutt to deliver his address. Sri Dutt is no stranger to us. As you may be aware, one of the outstanding results of his work is the C. O. 419, the wonder cane of India which dominates the whole of peninsular India and which has given record yields and recovery comparable to the best performances in the other sugarcane countries in the world like Hawaii, Java, etc. Our own State has benefited immensely from Shri Dutt's work as C. O. 419 which he gave to us now occupies a leading position in all cane tracts in Madras. I have now very great pleasure in requesting Shri Dutt to deliver his address".

# SOME ASPECTS OF THE ADVANCING FRONT OF AGRICULTURAL SCIENCES

**Address by Shri N. L. Dutt, Director, Sugarcane Breeding Institute, Coimbatore**

Shri Dutt prefaced his address with a comparison of the conditions of work now and about three decades ago. He said that there is a welcome change now not only in our national policies, plans and programmes, but also in our approach to our problems and in our very conception of what is our duty and function as parts of the national machinery for agricultural development. The idea now is one of effective service to the farmer, and the raising and maintenance of good crops in the country is now as much the responsibility of the department in the national interest as of the farmer himself. He drew pointed attention to the great improvements in the service to the farmers whether it be in agricultural engineering, plant protection or agronomical advice.

One wonders whether even a decade ago it would have been thought possible that the functions of the Agricultural Departments would come to cover such activities as Rural Welfare Scheme, Hill Tribe Uplift Scheme, Colonization Scheme, National Extension Service and Community Projects. The object of the Community Projects is nothing less than to secure the fullest development of material and human resources of the area — a highly desirable and laudable object. One more activity deserves mention and that is the Soil Conservation Scheme under which contour bunding and other linked soil and moisture conservation measures have been adopted. If these recommendations have found acceptance and willing execution from the growers, it can only have been through conviction born out of the personal persuasive efforts and the service-minded approach of the agricultural development worker. Steadily over the past few years since 1947, the change from 'advice' to service has been taking place and now it is one of the principal wheels on which the implementation of our 5-year plans has to move forward. It behoves all of us, in whatever sphere we are placed, to put our shoulders to the wheel, and it should be the special privilege of the young workers who have joined the ranks in the Agricultural Department to inculcate the idea of service and to put out the best effort they are capable of in the cause of our Nation.

I have taken the liberty of prefacing my address with the above remarks as I felt that our young workers should make a particular note of this necessary change in the outlook of agricultural scientists in the context of service to our Nation. And now I propose to take you rapidly over the main theme of this address, viz., how the concept in the agricultural sciences has advanced on a widening front. No attempt has been made to take all the agricultural sciences or even to deal comprehensively with those that have been taken, but merely to illustrate the point of a widening front.

**Genetics and Cytogenetics:** Among the most fundamental studies affecting plant breeding in particular and biological sciences in general are the researcees on the nature of the gene. Following upon a series of discoveries of far reaching importance on the material basis and mechanism of heredity in plants and animals, recent studies in biochemical genetics have suggested in essence that the gene is a nucleoprotein endowed with the quality of self-duplication and controlling the function and characteristics of the organism through a complex biochemical mechanism involving the production and action of enzymes. The specificity of gene-action is accounted for by the hypothesis of "one-gene one-enzyme"

In the wake of the discovery of the effect of Colchicine on chromosomes, work has proceeded on a wide sector on the effect of various alkaloids and other compounds on chromosomes. Interest has in recent years specially centred on chemical mutagens like mustard gas. Possibilities of the products of the plant's own metabolism inducing mutations have been investigated. The most interesting observation in the researches on mutagenesis is perhaps the specific action of different mutagens, some of the substances bringing about gene mutations, while others cause differences in chromosome arrangements; some affecting the heterochromatin, while others induce euchromatic changes. A new field has been opened up as a result of the development of atomic weapons and we may soon have information on the cytogenetics of plant material exposed to atomic radiations.

Induced polyploidy has greatly increased the possibilities and accelerated the pace of hybridization work. in plants. Although autopolyploidy by virtue of increased genomic complement confers benefits, within limits, in respect of increased size of plant and larger produce, such increases are associated with a marked reduction in fertility. Although the exact cause of such sterility are still somewhat obscure, the difficulty in autopolyploids has been partially circumvented by the use of hybrid material between near-races or products of cross fertilization in place of pure lines. The production of allopolyploids has gone apace and the discovery that many crop varieties and plant species are natural allopolyploids, has, as in many other fields of biological research, given a sound basis for further progress; for this means that whatever the methods adopted, the scientists' efforts parallel the processes of evolution in nature; only they are accelerated a million-fold and are to a large extent controlled and directed for the benefit of man. Findings on the genomic and chromosomal relationships between the related wild and cultivated species have led to the artificial synthesis of plants closely resembling existing species and varieties. In the cytogenetical work at our Sugarcane Breeding Institute, considerable knowledge has been gained on the homology of chromosomes as between sugarcane and allied species, and this has suggested possibilities of synthesising new types of cane.

Recent contributions in the field of biometry have greatly helped in the proper and accurate understanding of the laws governing heredity. Statistical methods now being generally used by agricultural research are applicable to discrete functions only. As Fisher has stressed, more refined methods for studying the variations in non-discrete functions like yield, chemical composition etc., should be adopted, since in plant breeding we are mainly concerned with the quantitative character, yield.

**Plant Breeding:** Remarkable advances have been made in maize genetics and, in general, plant breeding work has attained a high degree

of precision in the acquisition and incorporation of the desired genes in hybrid material. As a result, the value and utility of germ plasm of allied plants and related strains in plant breeding has enhanced greatly. This precision in breeding has been attained largely as a result of the work on different genomes and their combinations, as also from the investigations on monosomic and trisomic segregants. Unique hybrids in wheat and barley combining resistance to two or three types of rust have been produced, in some cases overcoming peculiar genetic obstacles.

The achievements of geneticists in the production of hybrid maize in U. S. A. are well-known. Although this technique of exploiting hybrid vigour is adaptable only to monoecious plants, attempts are being made to extend its benefits to other plants by the introduction of male sterility in pure lines. The scope of plant breeding has been extended through many fruitful investigations on the causes of sterility and parent incompatibility, and through the development of the techniques for the artificial culture of embryos. Genetics stocks are now being handled with such perfection and technical efficiency that crops practically 'tailored' to the local agricultural conditions and requirements can be produced; breeding of wheat varieties suitable for harvest by harvester-combines, and of cotton for the mechanical picking of bolls are just two examples.

**Botany:** The economic benefits of plant breeding are largely due to the collection, study and use of related plants in hybridisation; the assemblage of germ plasm in plant breeding centres has of late attained great importance. Genetic stocks have been collected through extensive expeditions, and important collections have been made of the germ plasm of potato, maize, sorghnm, cotton and other crops. In sugarcane also, a variety of wild types and species have been assembled, and we have at Coimbatore a large collection of *Saccharum spontaneum*, and scores of imported and indigenous canes, whose value as genetic stocks is being assessed. But apart from plant breeding, plant introduction by itself has played a great part in solving agricultural problems. There is now an increasing exchange of plant material between various countries, particularly in respect of plants suitable as forage crops and range grasses, of drought-resistant or winter-hardy crop varieties, and of soil-binding plant species. Botanical research bearing upon agriculture in certain directions has in recent years been influenced by new developments in taxonomic outlook. With the convergence of the branch-sciences of cytology, ecology, etc., on taxonomy, true phylogenetic relationships between different plant groups are being revealed. Studies have been directed towards evaluating intra-specific variution and understanding the dynamics of evolution. Experimental taxonomy using ecotypes and lesser climatic races of varions plants has adduced evidence on the fundamental basis of minor variation and explained the precise mechanism

of adaptation and natural selection in plants. Such studies on variation and adaptation in semi-cultivated range grasses, or wild species lead the way to better choice of material for purposes of introduction or for use in plant-breeding; they also help in more precise selections in progenies. Interesting progress has been made in this line of work on *Saccharum spontaneum* at the Sugarcane Breeding Institute, Coimbatore.

**Plant-physiology:** Rapid advances in our basic knowledge of photosynthesis have resulted from the development during recent years of highly refined methods of analysis. An important finding of immediate interest to us is that grain-filling in barley does not occur by the translocation of stored carbohydrates of the stem or leaf, and that photosynthesis of the green ear itself accounts for a sizeable proportion of the carbohydrates in the grain. Since grain yield is the most important factor in cereals, information on the assimilatory capacity of the green ear is of importance in varietal selection. The utilization of radio-active isotopes in plant physiological research has opened up immense possibilities. Release of the more stable radio-active carbon (C 14) in 1940 has helped greatly in the research on photosynthesis. Labelled nitrogen, phosphorous and other plant nutrient elements have aided in a fuller understanding of the factors and processes concerned in plant-nutrition. Investigations on the effect on plant yield of the interaction of various climatic factors has offered valuable information on the extent to which physiological adaptations may accrue as a result of the compensatory effects of climatic variables. Recent investigations on the mineral nutrition of plants have emphasised the role of light and temperature on the uptake and utilisation of nutrients. Day-length has come to be recognised as one of the factors concerned in the chemical composition and vitamin content of plants and plant products. Admittedly, these relationships are complex and the accurate measurement of climatic variables would help in the proper understanding of factors governing nutrition and crop yields.

As regards agricultural meteorological work, it may be said that detailed studies on the influence of weather conditions on crop yield are now being made for the past few years. Rate of development, number of leaves on plants and such other attributes have been correlated with weather conditions and form the basis for yield forecasts. These records further help us to pick out useful varieties and strains. Thus if we find that rainfall during a month affects the yield of a plant apparently because it retards leaf development, we can certainly select varieties in which the leaf development is not retarded by the adverse weather conditions.

Nevertheless, we must admit that these statistical methods of approach, however, useful, are rather empirical; For example, final yield

of a crop could be calculated by a series of statistical computations from the date at which the flowers appear. While we may satisfy ourselves by establishing an equation relating these two factors, we are unable to explain its physiological significance. It is necessary to understand as much as possible the inter-relation of the particular factors on plant development and final yield.

The discoveries of photoperiodism and vernalization of plants have inspired a large amount of experimentation leading to very important practical applications in agriculture. As a result of investigations at the Sugarcane Breeding Institute here, floral initiation has been induced in sugarcane by the application of short-day treatment.

It has been long recognised that the substance responsible for floral initiation is developed in leaves by the action of light; since this substance is subject to photosensitized destruction while in the leaf, it has to be transported to the stem in order to be effective. Graft experiments have indicated the identical nature of this substance in long and short day plants. Wavelengths ranging from 5,400° A to 7,200° A have been found effective in floral initiation, while the blue end of the spectrum is comparatively ineffective. The modifying influence of temperature on photoperiodism has been known for some time. A knowledge of the reciprocal influences between photoperiod and temperature is essential for evolving rational cultural practices.

Recent findings on vernalisation of developing embroys while still attached to the parent plants have a direct bearing on the seletion of areas for seed production and plant introduction. External applications of auxin have been successful in inducing flowering in certain cases and inhibiting it in other cases. While the differential response to auxin application has been made use of by growers, its physiology is not understood. The practical value to agriculture of major progress in this field is very great.

Following the classical researches of Went and Kogel on the influence of certain organic compounds on plant tropisms, a large amount of research on fundamental and applied aspects of auxins has been carried out. During the last ten years, new ways in which plants respond to growth regulators have been discovered. The effect of growth substances on the quality of plants and plant products may be stressed here. An interesting observation is that cattle sometime graze pasture plants sprayed with 2, 4-D in preference to unsprayed ones, and even browse on poisonous weeds which have been sprayed, although unsprayed, these plants would be avoided. The improved palatability may be due to the greater succulence of the treated plants and to the presence of larger amounts of sugars, unelaborated nitrogenous compounds, vitamins

and mineral salts in them. Plants treated with 2, 4–D are also more readily attacked by fungi. The direct influence of indole-butyric acid on the growth of fungi has been observed in *Fusarium.*

**Agronomy**: One of the most important advances in agronomy in recent years is the perfection of techniques of crop-logging through foliar analysis and other indices for purposes of fertilizer application and irrigation. Obviously, these techniques are not quite suitable for application to short life-cycle crops like cereals and are best used on crops like sugarcane where the harvest consists of the bulk vegetative parts of the plant and not the fruits or seeds. The development of weedicides I should place as the next important advance. Although these substances were not produced for this specific purpose, their use has come handy in the control of weeds at a time when soil physicists found that the utility of cultivation operations is not in the conservation of soil moisture but in the incidental destruction of weeds. As a result of the finding that chlorinated phenoxy acids had greater physiological activity, they have come into wider commercial use than Indole or Napthalene acetic acids. The mixture of two or more active compounds is said to be of value in certain applications. Mixed weed populations have been controlled more effectively by fortified oil emulsions.

The persistence of herbicides in soils has been studied in detail; the destruction of 2, 4–D has been found to be primarily due to the action of micro-organisms.

On fertilizers, one of the striking improvements of the past decade was in respect of placement. Studies have also been made on the differences in the degree of availability of nutrients in fertilizers under various conditions. Under march conditions in Cumberland, measurable differences were found in the oxidation-reduction potential of soils; oxidation took place at the soil-water surface but reduction lower down. The Japanese experts were the first to realise the bearing of these findings on the rice problem. They found that sulphate of ammonia put on the surface of field in the usual fashion at or before transplanting was quickly oxidised to nitrate which was promptly washed down and reduced to gaseous nitrogen. But, if sulphate of ammonia was pushed down through the oxidation-zone into the region of reduction, it lies there safely till the plant roots take it up. If nitrates like ammonium or sodium nitrate are added during the period of rapid growth, they can be absorbed quickly before they reach the reducing layer; therefore, they may be used as later top dressings. This is a very significant example of the far reaching results that may come from a purely academic enquiry. One of the best instances of the manipulation of fertilizer application technique is the recommendation that for increasing the nitrogen status

of the soil, leguminous green-manure crops should be fertilized with phosphates. Observations have been made on the perference of different crops to different forms of the same nutrient; liquid ammonia as a fertilizer, has come into fairly extensive use in the U. S. A. A recent far-reaching finding is that certain crop plants are capable of absorbing nutrients from fertilizer solutions sprayed on their leaves; fertilizer thus applied has led to improvement in the protein content or quality of the produce rather than in the yield. The greater efficiency of fertilizer when applied in this way is a further advantage.

**Plant Pathology:** Of the nearly 25,000 organic and inorganic compounds that have been tested for their fungicidal activity, only a few have been shown to be at least as effective as the orthodox Bordeaux mixture and the sulphur compounds. On account of the ease of preparation and application, several of these have been adapted to routine use. The demonstration of synergistic and antagonistic actions among fungicides and insecticides have raised problems in the application of new fungicides. The discovery of systemic fungicides is a recent and revolutionary development. These fungicides possess advantages over conventional fungicides in their effective coverage, efficacy against the hitherto intractable systemic diseases and in their non-interference with the natural balance in the shape of antagonists of plant pathogens existing on the plant surface. Antibiotics like penicillin, streptomycin, etc., which have proved themselves in the field of human medicine have been found useful against certain bacterial plant pathogens as well. The therapy of virus infection in plants is a recent development. Both heat and certain chemicals have been proved to be capable of curing certain specific virus diseases.

**Entomology:** While plant breeding has often given a helping hand in the evolution of pest resistant crop varieties, and still constitutes one of the principal means of combating insect pests, a more direct method with greater possibilities is perhaps the biological control of insects which has attained greater importance in application for agricultural purposes in recent years.

The most spectacular advances in pest control in recent years came with the discovery of the now well-known B.H.C. and D.D.T. While remarkable results have been achieved with these insecticides, and they have come extensively into general use, the possibility of the emergence of insect strains resistant to these insecticides has to be guarded against. Recently a number of other insecticides like Chlordane, Aldrin, have been put in the market which are proving increasingly useful. Mention should also be made of certain phosphorous compounds of great potency which are being developed as systemic insecticides. These may have particular value in the control of virus diseases transmitted by aphids

and other sucking insects. However, their effect on the plant and plant products as also on the consumer should be studied thoroughly before they can be put to regular use. Modern entomological research has progressed intensively in the direction of studies on population density, ecology and migration of insects, insect physiology and taxicology. These lines are bound to yield useful results of applicable value.

**Need for New Values:** This address has already become long and I think the above instances will serve to show to the young worker how the front in agricultural sciences has advanced and broadened. The need of the hour is not only for the agricultural research workers to change their mental outlook to one of service to the ryot, but also technically to equip themselves much better. This address will have served its purpose if it has emphasised ever so slightly and in its own humble way, the need for new values to the agricultural research worker. I cannot end better than by quoting the stirring words of our revered Prime Minister when he addressed a gathering at Dalhousie in the Punjab about a fortnight ago: "The time has come now for hard gruelling work. People with 'coat and necktie' mentality would hardly have any place in the new India."

JAI HIND.

## LIST OF PAPERS RECEIVED FOR THE 37TH COLLEGE DAY AND CONFERENCE 1954

| | NAME | SUBJECT |
|---|---|---|
| 1. | Dr. K. C. Naik. | Recent advances in Agriculture — Introductory Remarks. |
| 2. | Sri Ahmad Bavappa, K. V., and Srimathi Kalyanikutty, T. | A note on the sowing of Kolinji in standing crop of Paddy on the West Coast. |
| 3. | Sri Anantanarayanan, K. P. | Recent Advances in Agriculture — Control of Insect Pests. |
| 4. | Sri Aiyadurai, S. G. | Recent Advances in Agriculture, their potential importance to coconut industry. |
| 5. | Sri Balasubramaniam, C. | Recent Advances in Agriculture — Meteorology. |
| 6. | Sri Daniel Sundararaj and ,, Meenakshisundaram, D. | Recent Advances in Agriculture — Plant introduction and its further possibilities. |
| 7. | Sri Kalyanaraman, S. M., and ,, Santhanam, V. | Recent Advances in Cotton Breeding Research in the Madras State. |
| 8. | Dr. Krishnamurthy, S., and Sri Srinivasan, K. M. | Recent Advances in Agriculture — Growth regulators as Weed killers. |
| 9. | Dr. Krishnaswhmi, N., and Sri Raman, V. S. | Recent Advances in Agriculture — Cytogenetics. |
| 10. | Sri Kunhikoran Nambiar and Kumari Meenakshi, K. | Recent Advances in Agriculture — with special reference to the control of the root parasite Striga, affecting Sorghum. |
| 11. | Sri Narayanan, T. R. | Recent Advances in Agriculture — with special reference to weed control. |
| 12. | Sri Parthasarathy, S. V. | Recent Advances in Agriculture — with reference to Sugarcane in Madras State. |
| 13. | Sri Rajagopala Ayyangar, T. | Recent Advances in Agricultural Chemistry. |

| | | |
|---|---|---|
| 14. | Sri Ramakrishnan, T. S. | Recent Advances in Mycology and Plant Pathology. |
| 15. | Sri Ramaswami, K. | Recent Advances in Agriculture — A brief general survey with special reference to Rice. |
| 16. | Sri Ranganathachari, N. | Recent Advances in Agriculture — Extension work. |
| 17. | Sri Rangaswami, G., (Rutgers University, U. S. A.) | Recent Developments in the Chemotherapy of Plant Diseases. |
| 18. | Sri Sarma, A. H. S. | Recent Advances in Agriculture — Fertiliser production and use. |
| 19. | Sri Seshadri, C. R. | Recent Advances in Groundnut Growing. |
| 20. | Sri Subramaniam, T. V | Plant Protection in the Madras State. |
| 21. | Sri Varadarajan, S. | Recent Advances in studies on the Nutritive Quality of Staple Food-stuffs. |
| 22. | Sri Venkatachalam, S., and Dr. Mariakulandai, A. | Recent Advances in the feeding of Plants. |
| 23. | Sri Varisai Muhamad, S. | Recent Advances in Agriculture — with reference to Oil Seeds. |

## Symposium 'RECENT ADVANCES IN AGRICULTURE'

### Introductory Speech by Dr. K. C. Naik, Headquarters Deputy Director of Agriculture, (R), Madras

The subject chosen for this year's Symposium is undoubtedly of utmost interest. It is, however, possible that as it stands, the subject may convey somewhat different meanings to different persons. It could, for instance, be all-embracing if we refer to the achievements in the agricultural field in all parts of the world. On the other hand, the connotation could be narrowed down to only the national sphere or to the Madras State alone or again to the particular line of work in which each of us is engaged. Thus, some clash of ideas is inevitable, though this need not be necessarily deprecated. Very often, such clashes of ideas generate sparks of new lines of thought to illumine the discussion and promote a more fruitful understanding of the problem.

Among the papers which have been contributed for the Symposium, it is possible, therefore, that there will be a considerable variation in the emphasis laid on the different aspects of agricultural work. Some may lay stress on the recent advances towards self-sufficiency in food production in this country; others may shift the stress on the enhanced production through a specialised branch of extension work, such as the popularisation of the so-called Japanese Method of paddy cultivation; yet others may refer to the progress made in the field of research in their own line or in the country or in the world at large. It is difficult to say that any one of these approches is unjustifiable. All have the same intent or purpose, of measuring the recent progress, from the view-point of accelerating the same.

Let me endeavour to review the recent advances with the hope of obtaining an overall picture of the situation, without restricting my attention to only one of these various approaches or fields.

Of late, there has been a claim that our country has attained self-sufficiency in the matter of food production. This is indeed a matter of supreme gratification, coming as it does after a long period of strain and stress. The question, however, may arise as to whether we will be justified in accepting this achievement as an absolute standard of progress. With agriculture depending on the caprices of the monsoon, the fluctuations in crop harvests are exceptionally wide from season to season, so that any sense of satisfaction over the food production figures of a season may possibly prove to be an illusion during an unkindly season. It is necessary to guard against any sense of premature satisfaction and to prevent this from being switched over to a deeper sense of frustration with the on-set of any adverse season. It is positively dangerous to get into a spirit of complacency and formulate our inferences and plans based on a favourable season's achievement. This is a word of caution which, I think, it is worthwhile to utter at this stage.

There are many who have drawn inspiring hopes from the popularisation of the so-called Japanese method of paddy cultivation in this country. It is even claimed that this, admittedly alien or outlandish method of farming, has already made us march appreciably ahead. So far as this State is concerned, the results of our experiments which have been carried over a year have not been uniformly in favour of the Japanese method. Till we have more definite evidence of the superiority of any new method over a series of years, comprising of good, bad or indifferent seasons, it is obviously unscientific as well as risky to apprise the value of that new method. The only suggestion that seems possible at present is that while there can be no objection for popularising the agricultural practises which have proved their value, whatever the names may be, it is definitely to our interest to go slow withthose methods whose only virtue is that they have been acclaimed to have given outstanding results under some conditions in some parts of this vast sub-continent.

Farmers, agricultural workers and scientists have all been of the view that the greatest single factor which determines the crop patterns of any given region or country is the environment. Modern agriculture has, no doubt, been shaped to a considerable extent by the efforts of the State to bring assured irrigation facilities to otherwise suitable but parched up lands. Whether it be the agriculture that is completely dependent on the vagaries of the monsoon or on the irrigation bounties provided by the State, which also is really dependent on the nature, it cannot be denied in the final analysis it is the environment which determines the shape of agriculture in any given land. When, therefore, we have to tackle a method imported from a foreign land, it is essential we should give it a thorough trial before we advocate the same to the farmers. Fortunately, in this State, we have taken abundant precautions in this regard because the so-called Modified Japanese Method of Paddy Cultivation which this department is advocating, is nothing more or less than the method which

we have tested under our conditions and found them as the most suitable. Experience shows that this very method of ours when put across to the cultivators under the cloak of a slogan is more effective than otherwise. Therefore, our campaign for Japanese method is not in any way conflicting with the spirit of scientific agriculture or with the practical requirements of our farmers.

Progress in the field of research has also to be judged with as much caution and circumspection. If, for instance, several millions of acres are being treated with 2-4 D weedicide in America or if Krillium is an invaluable soil conditioner in that country or if Folidol is a wide-spread measure of control against Paddy Stem Borer in Japan or if mechanised harvest of cotton is the rule in some countries, it is no argument that they should all be equally applicable to our conditions. As a matter of fact, our experience so far has been that 2-4 D is not an infalliable measure of weed destruction in this State, that Krillium if used here will increase the expenditure by nearly Rs. 300/- per acre per annum, that there are too many breeds of the paddy stem borer to permit the use of Folidol as an unqualified success, that with our cotton varieties hand-picking is the only method feasible at present.

From all what I have stated, it should be clear that the research findings or agricultural practices evolved or extant in one region, may have little or no value in another region. Our farmers cannot draw inspiration from the research findings at the Indian Agricultural Research Institute, New Delhi, nor from the farming practices followed in the Punjab or Bengal. We have to carve out our own salvation through our efforts and our research organizations in each of the various soil climatic zones of this State.

In this connection, it would appear that an objective examination to see how far our present day research organizations and methods to improve our agriculture are in keeping with our present day requirements, is very necessary. When this department was started, scientific conceptions and technique were in some respects as far removed from those of to-day as the shifting cultivation is from the modern mechanised farming. In fact, introduction of horse-drawn ploughs and hoes from the United Kingdom was considered as an effective means to improve Indian Agriculture in the days when the department was brought into being. Much water has flown since then and it may be very much to our interest to examine how best our organisation can be improved upon to render more effective service to the science of agriculture and to the farming community. Recent advances in Agriculture as are being reviewed to-day may be deemed as a milestone, to point out the way for further advances, by analysing our methods, technique and organisations; so that all of these may be improved upon, in order that they may be the instruments for real progress.

# CENTENARY CELEBRATION, MADRAS STATE HERBARIUM

1853 — 1954

## Welcome Address by Sri M. S. Sivaraman, I.C.S., Director of Agriculture

I consider it a great privilege to welcome all of you to this Centenary Celebration of the Herbarium attached to the Coimbatore Agricultural Research Institute.

Our Herbarium had an uncertain origin prior to 1853 beginning with the private collections of Dr. Cleghorn, a Professor of Botany in the Madras Medical College and later a Conservator of Forests. It was at first an adjunct to the Madras Museum, in charge of the Government Botanist and with the change in the Headquarters of the Botanist, it was shifted to Coimbatore in 1909. Various private collections have helped to build up the Herbarium and these have been further augmented by botanical surveys of the flora of South India. It is now easily one of the largest Herbaria of India with over 1·7 lakhs of plant specimens of South India. Such a systematic repository of plant specimens is a great help in identifying plants and studying the distribution, potentialities and proper utilisation of the plant wealth of the country and it is a matter of great pride to us that this Herbarium serves as a clearing house of botanical information catering to the increasing demands of the general public, research workers and medical men. Among the pioneers who have been associated with this Herbarium, there were a large number of medical men and by a happy coincidence we have in our midst today one of the most distinguished of our medical authorities, Dr. A. Lakshmanaswamy Mudaliar. On behalf of the Centenary Celebration, I extend to you, Sir, a very cordial welcome.

## Centenary Report by Sri C. Rajasekhara Mudaliar Systematic Botanist and Prof. of Botany, Agricultural College, Coimbatore.

Though the exact date or year when the Herbarium had its origin is not clearly known, it is definite that Dr. Hugh Cleghorn, the then Prof. of Botany at the Madras Medical College, was responsible for starting it. Specimens collected by him bearing the labels of Madras Museum Herbarium, 1853 show that it must have been started about that time. The nucleus materials were from the collections of Sir W. Elliot, Dr. Cleghorn and Dr. Drew about the year 1853. The collections were enriched by those of Col. Beddome containing 6,000 sheets. Then came George Bidie who made collections of medicinal plants and published a monograph on medicinal plants. In 1874 Prof. Lawson started another Herbarium known as Madras Herbarium and prepared a catalogue of plants growing in Madras Presidency. This included 3,295 species. Further contributions were done by Dr. A. G. Bourne and Dr. Edgar

# MADRAS HERBARIUM

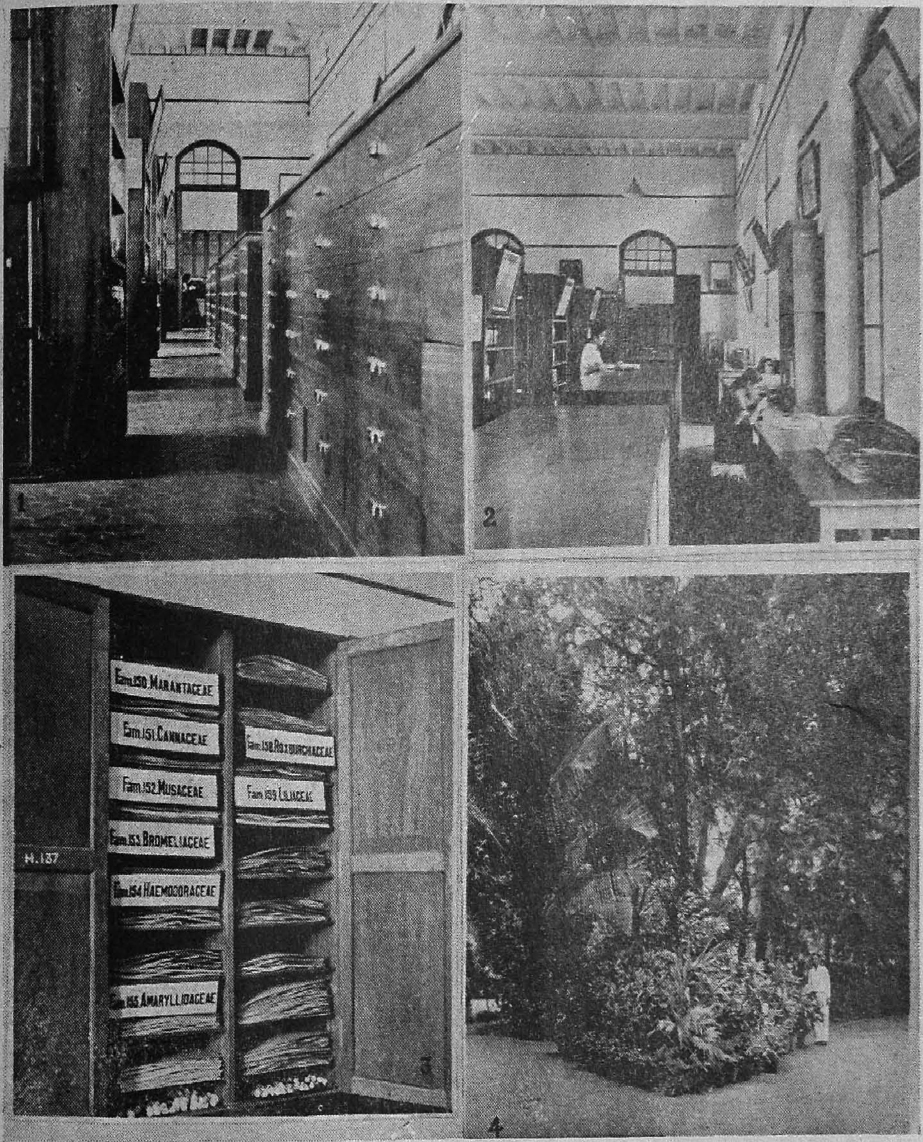



FIG. 1. Carpological cases.

FIG. 2. Laboratory.

FIG. 3. Herbarium cases.

FIG. 4. A view of the Botanical Garden.

# HUNDRED YEAR OLD SPECIMENS

## 1853 — 1954

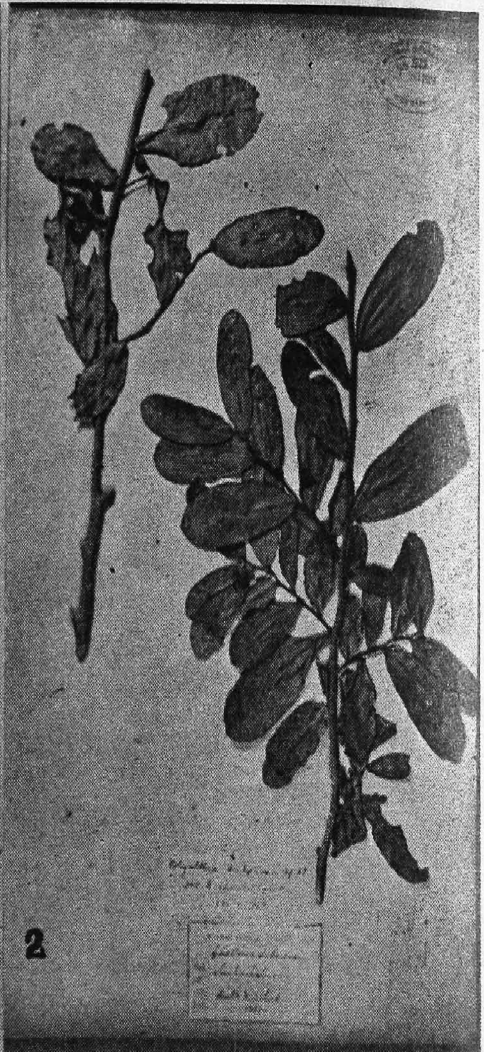



FIG. 1

FIG. 2

1. Guatteria longfolia. Coll. Dr. W. F. C. Cleghorn.
2. Guatteria suberosa. Coll. Dr. Elliot. 1853.

Thurston. From 1897 onwards Sri K. Rangachari was Herbarium-keeper at the Madras Museum Herbarium. The two herbaria seem to have become merged together at some time. In 1898 the herbarium came under Dr. C. A. Barber who was appointed as Government Botanist, Madras and Director of the Botanical Survey of S. India. When the Madras Agricultural Department was organised in 1902, the Office of the Government Botanist was transferred to Coimbatore in 1909, the Herbarium also was shifted to Coimbatore and is housed in the Agricultural College and Research Institute. Till about 1908 the herbarium had 40,000 specimens. Dr. Barber continued to be in charge till he was transferred as Government Sugarcane Expert in 1912. His collections alone exceeded 16,700 specimens of wild plants and 4,500 specimens of odd economic plants and mycological specimens. During 1912 the Government Botanist's post was split into the Government Economic Botanist and Lecturing Botanist. The latter was in charge also of Herbarium. Sri Rangachari was Lecturing and Systematic Botanist 1912 to 1923. He added to the wealth of the herbarium especially grasses and flora of Tirunelveli district. He published along with Sri C. Tadulingam the "Hand-book of some South Indian Grasses". C. Tadulingam Mudaliar succeeded Sri Rangachari.

From 1929 to 1942 the Madras Herbarium passed through several administrative hands like Sri V. Narayanaswami, P. Jivanna Rao, S. N. Chandrasekhara Iyer etc. The Madras Herbarium through the labours of the above workers and assistants has grown to possess nearly 1,70,000 specimens, representing the flora of Madras Presidency including Mysore, Coorg, Cochin and Travancore, some specimens representing North India, Burma, Malaya, Ceylon and other foreign countries and also specimens of garden and economic importance. These specimens were sent from time to time to and got authenticated by Kew. They were utilised by Gamble in the compilation of the Flora of the Madras Presidency. Since then the general arrangement of the sheets follows Gamble's so far as Madras is concerned and North Indian specimens according to Hooker's classification. The Herbarium now contains the very valuable collections of Wight, Beddome, Bourdillon Gamble, Hooker and Thompson, Perrottet, Heyne, Rottler Schmid, Jowitt etc. Besides these there is also a large carpological and seed collections. The library attached to the herbarium contains also the rare and earlier publications on Systematic Botany of Linnaeus, Willdenow, De-Candolle, Engler and Prantle, Rheede, Rumphis etc. Besides the publications mentioned a survey of South Indian weeds was published by C. Taduligam and G. V. Narayana. The work continues to be on both economic and academic lines. Fresh surveys both regional and general have been going on. As an adjunct to the Herbarium is a small Botanical Garden which now serves also on a minor scale as a plant introduction and acclimatization centre.

## Introductory Speech by Sri M. Bhaktavatsalam, Minister for Agriculture, Madras

***Friends,***

We are met here today to celebrate the Centenary of the Madras State Herbarium which is reputed to be the second best in India. Beginning originally as a small collection of plants in the Madras Central Museum in 1853, it was continuously enriched by successive generations of botanists, so that it now contains over 1,70,000 specimens representing the flora of South India and about 25,000 specimens representing the flora of North India. We must be proud that the Herbarium has now completed 100 years of its useful existence and on this occasion we should render tribute to Dr. Hugh Cleghorn, Col. Beddome, and Dr. C. A. Barber and others who laboured in the earlier years and to eminent botanists like Sri K. Rangachari, Sri C. Tadulinga Mudalir, Sri P. S. Jeevanna Rao, Sri S. N. Chandrasekharan and others who developed it subsequently.

The Herbarium has gained a fine reputation in the field of systematic botany through its publications like the Handbooks on South Indian weeds and grasses and supply of information to enquiries from various quarters and hence it is a great national asset. Those to whose care it has now been entrusted and will be entrusted in the future should deem it their privilege to preserve and enrich the fine collection of specimens and to make it serve more and more its purpose as a clearing house of botanical information and thus help in the proper utilisation of the plant wealth of the country.

I feel that there is considerable scope to expand the usefulness of the Herbarium in the agricultural, pharmaceutical and industrial fields. The flora of our State which covers a wide range of altitudes and regions from the sea coast to the highest peak of the Western Ghats is infinite in its variety and there is vast scope for work for the Botanists for their identification, classification and economic exploitation. The identification of new plants and their putting to uses hitherto unknown has a wide possibility of striking new lines in agriculture. The Forest and Medical men will also need consultation in the matter of identification of plants in many matters. The Botany departments of the Universities will also have the benefit of the classified knowledge available in the Herbarium which, if I may so put it, is a library of plants. Our country is well known for its indigenous systems of medicine like the Siddha, Unani and Ayurvedic, in which medicinal plants have played a very important part. Even in other systems, plants still continue to be the primary sources for many of the products that are necessary in treating the sick and the ailing. For example, there is at present said to be a keen demand for the roots of *Rauwolfia serpentina* in foreign

markets for the preparation of drugs for epilepsy and similar diseases. The chief source for this plant is South India. Unfortunately with increase in demand, spurious and adulterated materials also get into the market. There is another species of *Rauwolfia* - *R. canescens* occurring in certain places, which is very similar to *R. serpentina*. Studies on their distribution, quality of the active drug in each and the possibilities of multiplying the plant are a few of the points that could be taken up with the help of this Herbarium.

I understand that the herbarium staff have taken up the preparation of regional floras. The flora of Tirunelveli district have been completed and the flora of the Ramanathapuram and Coimbatore districts are in the process of compilation. Such regional surveys are very important. In this connection, I may mention that it is stated that the medicinal properties of the waters of the Courtallam river might be due to the effect of certain drug plants occurring in the areas through which the river flows. I do not know whether the drug plants growing in those areas have already been collected. Similarly the breeze wafted over the plants and herbs on the hill at Tirukalikundram is well known to have health-giving effects. A survey of such plants would be useful.

I am very happy that Dr. Lakshmanaswami Mudaliar has kindly agreed to preside over the Centenary. It is in the fitness of things that an eminent medical authority and the Vice-Chancellor of the University should be associated with this Centenary. It will be remembered that the nucleus of the present Herbarium was collected by Dr. Hugh Cleghorn who was Professor of Botany in the Madras Medical College and medical men have evinced keen interest in the utilisation of the flora of this State. It is also a happy augury for the researches at the Universities will be linked up with the work done by the Government Department of Agriculture and the Agricultural College. I am sure we will profit by the ideas and advice which Dr. Lakshmanaswami Mudaliar will be able to give. I have now great pleasure in requesting him to deliver his address.

## Address by Dr. A. Lakshmanaswami Mudaliar, Vice-Chancellor, Madras University

*Ladies and Gentlemen,*

I am deeply sensible of the honour you have conferred on me in asking me to preside over the centenary celebrations of the Herbarium. It is but fitting that this centenary should be celebrated at Coimbatore, one of the earliest centres for the development of higher agricultural education. Coimbatore was in the past known more for its pleasant climate throughout the year and for the great leaders in different fields social, political and economic activity in the State. But, within the last

twenty years, a silent revolution has taken place and, today, Coimbatore is one of the most advanced cities in India — advanced in regard to its technological, educational and social progress. No other city presents in a like manner a combination of all these great activities to the extent to which Coimbatore does. The progress that has been made in regard to the textile industry is indeed remarkable and, today, if South India can boast of a textile trade which places it more or less on an independent basis, it is because of Coimbatore and a few other centres.

But the progress that I have in mind as truly remarkable is in the direction of its educational activities, thanks to the enlightened policy pursued by its leading citizens. It was barely twelve years ago that I visited Coimbatore to consider the possibilities of upgrading a small tottering second-grade college in this city. And when I look back upon the progress of education in the last twelve years, I am overjoyed at the many institutions that have sprung up. A college of engineering, a polytechnic, a first grade college with arts and science equally developed, a women's college, a college of technology founded by private benefaction, another college with potentialities of great improvement, not to speak of a thriving agricultural college ; these are not mean achievements for any city within a decade. But it is not only in the educational endeavours that the citizens of Coimbatore have shown their philanthropy. Here, I have seen real and sustained enthusiasm to bring into existence many a medical institution. The women and children's hospital, the tuberculosis sanatorium and the tuberculosis annexe of the Government Hospital, not to speak of other smaller institutions that have sprung up, are an eloquent testimony to the public spirit of the citizens of Coimbatore. When, occasionally, a jarred note is sounded and a carping critic speaks of the wealth of the mill-owners of Coimbatore, I feel that it would be gross ingratitude to forget the other side of the picture and not to take account of all that has been done and is being done. But they say that gratitude is a sense of lively favours yet to come and I agree that, so far as Coimbatore is concerned, my sense of gratitude, if I may unblushingly confess, is a lively sense of favours yet to come. I am sure that the public-spirited citizens of Coimbatore will not be providing greater and greater amenities in all spheres of social service not only to the people of Coimbatore town but to the people in general of the District, aye ! of the neighbouring Districts.

My purpose today however is to speak about the Herbarium and, if I may be permitted to say so, to say a few words about the Agricultural College and the progress of agricultural education in general. We owe this Herbarium to a number of eminent European scientists who, with rare foresight and determination, exercised their very best to collect all these specimens of the flora of this part of India and to make a beautiful Herbarium for posterity to benefit. I am glad however that

the coutributions that have been made by successive generations of Indians have been no less remarkable. Few perhaps are aware of the importance of a Herbarium. It is a matter for regret that not much attention has been drawn to this particular aspect of the development of agriculture in its broadest sense. We are not in a position to know exactly, even after so many centuries, what the agricultural resources of our country are. There was a time in the past when the village folk and even the so-called town folk knew far more of the plants, of the varieties of grass, of the different kinds of trees and what is far more important of those plants that were used for the production of drugs for many diseases. It is unfortunate in one respect that the easy availability of medicines manufactured in the West has dulled our sense to a better realisation of the resources of our country and to the proper utilisation of the many plants that can serve as excellent material for the production of drugs, so very useful to promote health and to prevent disease.

It may surprise some of you to know that the recent trend in medical advance is more towards relying on herbs and what may be called the lowest forms of vegetable life. How many of the audience, for instance, are aware of the fact that the most potent remedy for infection, penicillin, was just an accidental discovery by Fleming when he cultivated some of the lowest types of vegetation. Every effort is now being made to search for these lowest forms of vegetable life and to note their potentialities in the killing of organisms which, though minute and almost ultra-microscopic, are the greatest dangers to human and animal existence. It is therefore my hope that the centenary of the Herbarium will once more kindle in the minds of all botanists and other scientists an interests in the study of plants and other vegetable life and the part they play in preventing the spread of microscopic and ultra-microscopic infections. But this knowledge will be useful not only in regard to prevention of diseases in the human and animal life but, what is perhaps not so commonly understood, it will have a potent influence in the promotion of the healthy growth of vegetable life and the prevension of some of those unfortunate pestilential organisms that devastate large areas of budding crops.

Speaking under the auspices of the Ministry of Agriculture, let me next refer to a point which I feel has received very little attention indeed. When we speak of agricultural education in the State, let me frankly confess that most people will have the impression of the type of education that is given in the Agricultural College here. I have myself raised my feeble voice of protest that this education that is imparted does not promote in the students, who pass out of this College, those inherent inclinations and qualities which will force them to take to agriculture as a career. I think it was one of the most unfortunate trends in the sphere of agricultural education when, through a mistaken notion of

State patronage, graduates of Agricultural Colleges were given employment in diverse fields. I cannot imagine a more wasteful method of professional education than to allow a graduate in agriculture to be recruited as a clerk in the Revenue Department or as an officer in the Transport Department, not to speak of more bizarre types of employment. If only the Government, at an earlier stage, had firmly insisted upon agricultural graduates turning their attention to the plough and not to the pen, agricultural education would have taken a practical turn and the graduates turned out of Agricultural Colleges would have had a better opportunity of utilising their knowledge and training in the furtherance of agriculture. I hope it is not too much to ban all agricultural graduates from taking to these diversified forms of employment which have nothing to do with their education. It will shock many if a graduate in medicine takes to the work of an upper division clerk in a Government Office. I do not know how the idea of a graduate in agriculture quill-driving in a governmental office amidst damping surroundings could be less shocking. But the defect in agricultural education is even fundamental. No type of education has received less attention than agricultural education in regard to equipment in the field of agricultural enterprise. There is a great deal of talk and the cry is voiced far too frequently; "Go back to the land." But the very people who are loudest are those who have little or no faith in the slogan. This difference between what we preach and what we practise was brought home to me when, as Chairman of the Secondary Education Commission, I went round the country and saw the state of agricultural education elsewhere. In a few places in the north of India, there were the so-called agricultural schools; but the depressing sight of the students taking to this education as if they were taking a bitter pill will never efface itself from my memory. If agriculture is to develop, if there is to be a real zest in the development of the land, and if more modern knowledge of agriculture is to spread, the place to begin agricultural education is from the earliest stages of development.

Our farmers' children were far better educated because of their practical application to the problems of the land along with their parents than the children sent to schools nowadays are. It is shocking that in the cities and even in certain of the rural areas, children and the school-going population and even adults know very little of the crops that are raised and are unable to differentiate between one crop and another in a large field. It is for these reasons that the Secondary Education Commission has emphasised the need for the study of agriculture at the secondary school stage. It is for these reasons that they have suggested that, for many a school, a plot of land should be given where the pupils and the teachers may throw their energies into the development of that land and in that manner learn something of agriculture. Unless therefore, the Government takes up measures, not in isolation here and there

in a few places, but as a concerted planned method of developing agricultural education in as many schools as possible, particularly those situated in rural areas, there is very little possibility of real progress being made in the field of agricultural education.

We speak very often of the great progress made in countries like the United States and Japan in agricultural production; but we do not realise that this production was the result of development of agricultural education to all grades and in all sectors, not merely in schools and colleges but in the homes of the farmers so that the very life of the farmer is permeated with the latest and most recent advances in agriculture. Not only is this the case but, in the United States, sums of money have been given for the development of agricultural education; funds have been placed at the disposal of schools and colleges; farmers societies have been established; competitive enterprises have been organised; and, in many other ways, the federal government has come to the assistance of the agriculturists in speeding up many an agricultural enterprice. Let me however be not misunder-stood as being ignorant of the great endeavours that have been made in recent years in independent India. We have had some progress but is it commensurate with the need of the times nor with the possibilities of the great developments in this field.

Let me touch upon another aspect of agricultural advance. Research is the key to all agricultural development and, if research is to succeed in agriculture, it must be planned on a largely co-operative basis with many other scientific activities. To-day, the remarkable advances in science are so staggering in their nature and so full of possibility for every other branch of development that no particular branch can afford to stand in isolation. Agriculture, like medicine, should be both a parasitic and saprophytic agent. The discoveries in physics, in chemistry, in geology, in the many fields of zoology and botany, are all matters of concern to agriculture. The very atomic energy, that causes consternation in the minds of many at the very thought of its devastating effects, is a source of energy which can be harnessed for productive wealth. I cannot with any degree of varacity say that, good as the work has been in our Research Departments, there has been either enough progress or enough encouragement in the field of agricultural research. What have we been able, within the last fifty years, to show that new forms of vegetation can be grown successfully in our country at different altitudes? What substantial progress have we made in the direction of analysing the nature of the soil and the factors that contribute to the proper growth of plants? What measures have we taken for research in regard to high altitude plant life? And yet, in India, nature has blessed us with a climate which can, at one place or other, simulate the arctic and the antarctic cold, the blasting heat of the tropical sun and the more

pleasant and even temperate zone: Which country in the world possesses all these great advantage? Mighty rivers that flow through our plains, the high altitude mountains from the great Everest down to the smaller hill stations in the south of India. Has the agriculturist done anything material to discover the possibilities of new vegetation at these different altitudes. It is this thought that has recently provoked the University of Madras to think of establishing a high altitude botanical research station and it is with this hope that the University has addressed the University Grants Commission for a grant to start a botanical research station at Kodaikanal where the soil, its fertility and the nature of plant growth that can be established can be studied at varying altitudes between 3,000 to 8,000 feet above sea level. I have no doubt that some of these problems will appeal to our Government but we must educate our masters and educate them in such a manner that they are fully equipped with the knowledge without realising that they are being silently educated. That is one of the fundamental problems of educating a democracy. A democracy resents the idea, when it is put plainly, that it has to be educated but the silent manner in which those who know the subject and are conversant with the methods of approach can educate will certainly go far to make democracy realise in the long run that there are many things in heaven and earth than have been dreamt of.

I do not want to tire your patience; but, when I look back to what has been done during the past hundred years and when I look forward with hope, eagerness and longing to a throbbing flourishing India on the threshold of great potentialities, when I look to the millions of our countrymen who in the free and independent India that is theirs are hoping for the miracles to happen without realising in a sufficiently intensive manner that hard work, incessant work and laborious work are the only factors to produce miracles; when I think of the easy platitudes that are spoken on platforms of the hardships of this or that class of people and the unfortunate trend of the concept that duties and responsibilities go always hand in hand with rights and privileges; when I think of all these things, I feel sometimes very much obsessed with a feeling of intolerable depression. Every time that I have had the opportunity of going to foreign countries, seeing something of what is happening there—at least in most of the countries—look upon the life of the people there, the hard untiring labours through conditions, climatic and otherwise which are far from congenial, when I come back and see the almost snail like progress which we sometimes make in many fields, I confess to a feeling of great dejection. Yet, there is hope and hope springs eternal in the human breast.

I believe, and fondly, that to-day there is a greater inclination among our countrymen, among the youth in particular, to play their role given the proper encouragement, given the proper guidance and

given the right advice. Nothing will conduce to success in life so much as a spirit of discipline and orderly life and it is my hope that we shall, now that we are entering on the eighth year of independence, realise that the true welfare of our country, of the masses, lies not in speaking eternally of a welfare state but in doing something tangible, something which has earned its due reward whatever may be the role that we may have to play. I hope and trust that the celebrations of the centenary of the Herbarium will serve as a great energising force not only for the Department of Agriculture and the Agricultural College here but for the Government, the Ministers of the several Departments and their Secretaries as well and to the large number of legislators and the general public, to take a keen and abiding interest in the furtherance of agricultural education of the true type and in the development of the many great natural resources which God and a kindly Nature has furnished us.

## Vote of Thanks by the Principal

*Dr. A. Lakshmanasami Mudaliar, Hon'ble Minister for Agriculture, Ladies and Gentlemen,*

As the Principal of this Institution, it is my privilege to propose a vote of thanks. We are very grateful to Sri A. Lakshmanasami Mudaliar, Vice Chancellor, Madras University for having accepted the invitation to preside over the centenary celebrations of the Madras Herbarium. On behalf of the officers of the Agricultural College and Research Institute, Coimbatore I congratulate and offer the warmest felicitations on the conferment of the title 'PADMA VIBUSHAN' on the distinguished President of today's function. I need not add that not only the State but the entire country will feel proud of the honour conferred on him on the Independance Day. The hundred years which have passed since Dr. Cleghorn made the first collection to form the nucleus of the present herbarium, have witnessed not only a very rapid expansion due largely to the enthusiasm and sustained contributions made by the successive Botanists attached to the Agricultural Department from the year 1898 but has also earned recognition of famous Botanists in Kew and other countries. The Botanical Section is a treasure house of recorded in formation on plant wealth of South India, and the survey of grass species undertaken by them has been very useful in developing types suitable for fodder, pasture and soil conservation work. Let us wish the section a long period of usefulness, service and progress. On behalf of the organisers of this function, I take this opportunity to thank all the invitees for having responded to the invitation and for having contributed to the success of the celebrations.

## General Body Meeting

The annual general body meeting of the Union was held on Sunday the 22nd August at 9-30 A. M. with Sri R. Balasubramaniam ex-officio President in chair. After the presentation and adoption of the minutes of the previous general body meeting, annual report and the auditor's report the following office-bearers were elected for the year 1954—55. Sri M. R. Balakrishnan declared that he would become a patron of the Union.

| | |
|---|---|
| Sri R. Balasubamaniam | Ex-officio President. |
| Dr. N. Krishnaswamy | Vice-President. |
| Dr. A. Mariakulandai | Editor. |
| Sri F. L. Daniel | Secretary. |
| Sri N. V. Sundaram | Manager. |
| Sri M. V. Jayaraman | Treasurer. |

The members of the council, both residential and moffusil, managing committee and editorial board were duly elected. The meeting came to a close with a vote of thanks proposed by Sri A. Mariakulandai.

## Report of the Managing Committee for the year 1953 — '54

The Managing Committee presents the following report of the activities of the Union for the year 1953 — '54.

**Membership**: The strength of the Union as it stood on the 31st of July 1954 was 1144 as against 1450 of last year consisting of 455 Officer members, 294 Student members, 150 Residential Members, 245 subscribers and 23 Patrons. Consequent on the division of the Madras State, 273 members in the Andhra State, 16 in the Mysore State and all the Students of Bapatla Agricultural College have disassociated themselves from this Union. The number of members on the roll of the Union is, therefore, poorer to that extent. The Committee urges all those present here to launch an intensive campaign to enrol as many members as possible.

**Office Bearers**: Sri T. V. Subramaniam, our Manager, had to resign his post prematurely due to his transfer to the Nilgiris. The Committee records its appreciation of his services with thanks, during the period he officiated as Manager. On his resignation, Sri K. Ramanujam was co-opted as Manager.

**Meetings**: During the year the Managing Committee met 12 times, to transact the routine items of business.

**The Madras Agricultural Journal**: The Journal continued to be published regularly and promptly due to the untiring efforts of the Editor,

the Editorial Board and the Press to whom the Committee tenders its heartfelt thanks. The Editorial Board met 11 times during the year to select articles for publication. The papers received for the Symposium held during the College Day and Conference in 1953 are to be published as a special number which is pending the financial sanction of the Government.

**Finance**: The financial position of the Union is not very sound. It has deteriorated since the separation of the Andhara State. The Managing Committee has tried all possible means to improve the finances through recruitment of more subscribers and Patrons.

The Managing Committee has approached the I. C. A. R. for an yearly grant of Rs. 2000/-. The District Market Committees have placed funds at the disposal of the Union to the extent of Rs. 400/- annually for printing a 5 page "Marketing supplement" in the Madras Agricultural Journal. It is left to the General Body to suggest other ways and means of improving the finances of the Union so as to bring out our Journal with all round improvement in the years to come.

**Ramasastrulu Munagala Prize**: Three papers were received for consideration for the prize. The papers were valued by a Committee of three Judges nominated for the purpose. The paper entitled "Enzymatic Studies of *Aspergillvs Oryzae*" was awarded the prize. The Committee congratulates the winner Sri S. Varadarajan of the Chemistry Section and thanks Dr. G. S. Siddappa, Dr. P. Satyanarayana and Dr. S. Krishnamurthy for kindly acting as Judges. Sri K. Vekitaswamy Naidu gave a silver medal for the second best essay, for this year.

**Acknowledgement**: The Committee thanks the members of the Union and the Students of the Agricultural College for their whole hearted support given in running the varied activities of the Union successfully. Our thanks are due to Sri R. Balasubramanian, Principal, Agricultural College, Coimbatore for his keen and sustained in interest in the affairs of the Union. We have also very great pleasure in recording over thanks to the convenors and members of the various Committee for their whole-hearted co-operation and help in the conduct of the College Day celebrations.

***A. Mariakulandai,***
*Honorary Secretary.*

## Farmers' Day Celebration

The Farmers' Day celebrations were conducted on the 19th forenoon at the Central Farm. A large gathering of farmers, officers, visitors and Farm labourers attended the meeting. The entire proceedings were conducted in the regional language.

The Principal, Agricultural College and Research Institute after welcoming the Minister for Agriculture, Madras State, Farmers of Coimbatore district and other visitors stated that it was in 1950 on the instructions of the Director of Agriculture these celebrations were first arranged and thereafter became an annual feature of the Department. The purpose of these celebrations was to popularise the activities of the Department, and to include in the programme exhibits for bringing out the various attainments, demonstrations of improvements in field and talks by specialists on scientific problems of the tract. Such celebrations were considered as necessary and indespensable activities of the Agricultural Department not only for disseminating the latest finding in actual cultivation, and be useful in exchanging notes with visiting farmers, in understanding their difficulties to implement the suggestions of the Department and in eliciting information on other urgent local problems. He stated that during the year, the Central Farm produced and supplied for distribution in the districts 40 tons of improved varieties of paddy seeds, 50 tons of seed millets and seeds of MU 1 cotton sufficient to cover 700 acres of seed farms. Beside the above, the farm was able for first time to offer for sale 60 tons of surplus fodder after reserving the requirement for the whole year. It was not only self-sufficient in regard to its own requirements of green manure but also supplied seeds to cultivators and district officers. He said the notable features of the exhibits arranged include 1. the new paddy variety resistant to blast, 2. the short duration P. 216 F cotton fit for cultivation on rice fallows of single crop wetlands of Coimbatore district, 3. short duration hybrid cumbu H. 866 suitable for irrigated summer, 4. the solution to the green manure problem of rice crop and 5. the bullock driven double acting pump for lift irrigations. This year he said that the Young Farmers' Course was in session and has given them an opportunity to take part in the College Day functions and Farmers' Day celebrations.

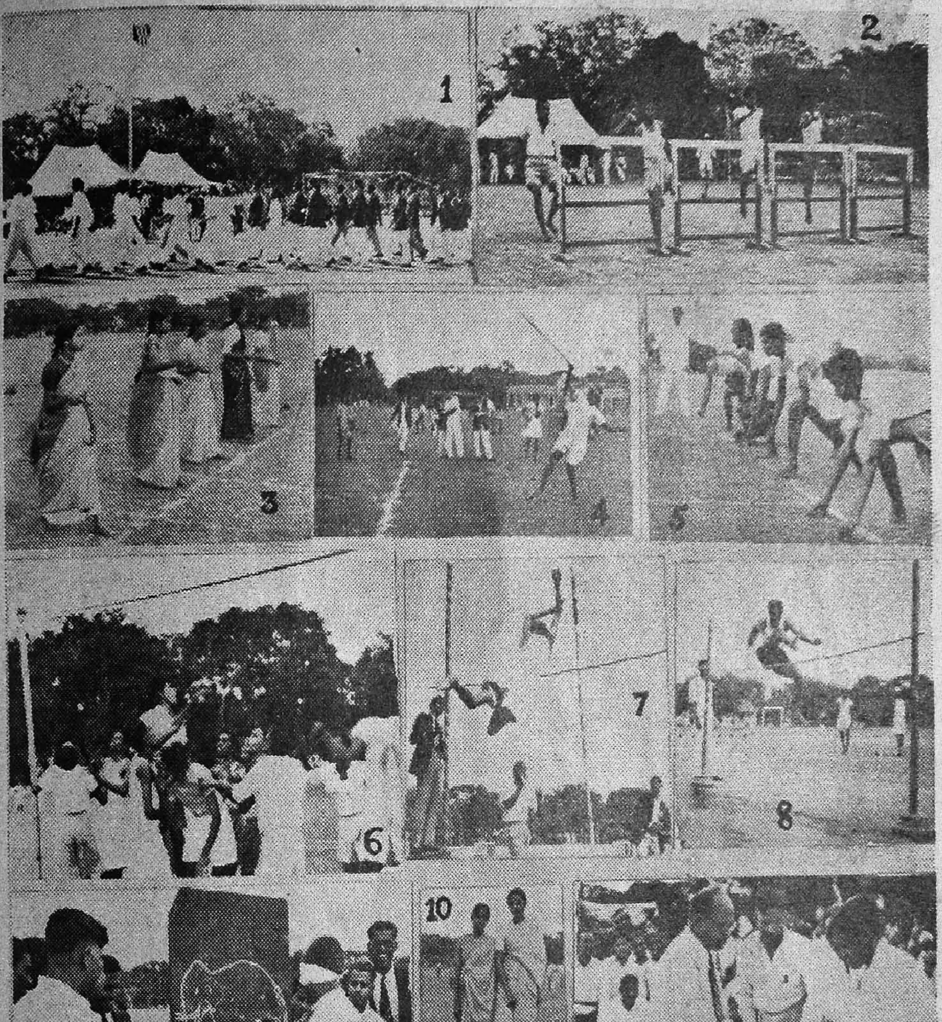
Several farmers spoke of their experience and replies were given by the specialists. After a vote of thanks the meeting ended with singing of National Anthem.

---

## RESULTS OF COLLEGE DAY SPORTS

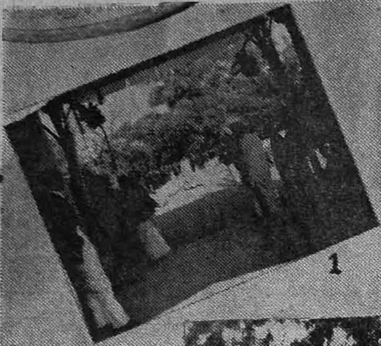
1. CROSS COUNTRY RACE (5 miles) THE NORRIS CUP. (36 min. 13 sec.) (1) N. K. Periaswami, (2) J. M. Alfred, (3) T. L. Subramaniam. 2. POLE VAULT (8 ft. 0 in.) (1) Gadadharan, (2) Javad Hussain, (3) Jagadeesan. 3. 110 METRES HURDLES (THE RAMASWAMI SIVEN CUP) (20 sec.) (1) Javad Hussain, (2) Marappan, (3) Sankaran. 4. SHOT PUT (31 ft. 2 in.) (1) W. Odongo Omamo, (2) Dharmaratnam, (3) Tie. D. V. Viswanath. 5. 100 METRES DASH (THE SAIDAPET OLD BOYS CUP) (11 4/5 sec.) (1) K. Marappan, (2) P. K. Ramakrishnan, (3) Premnath Alwa. 6. LONG JUMP (16 ft. 10 in.) (1) Kochunni Kidav, (2) G. A. Sivaraman, (3) S. V. Ponnuswami. 7. 200 METRES HURDLES (30 sec.) (1) Marappan, (2) P. K. Ramakrishnan, (3) P. Shivaram Rai. 8. HIGH JUMP (THE TADULINGAM CUP) (5 ft. 2 in. equals college record) (1) G. A. Sivaraman, (2) Kochunui Kidav, (3) Saldanah, 9. INVITATION RACE (800 Metres) (1) K. Ramaswami, (St. Michaels), (2) Joseph Varkey (P. S. G. Technology), (3) V. Arumugham (P. S. G. Arts), 10. HOP STEP AND JUMP (35 ft. 8 in.) (1) G. A. Sivaraman, (2) P. K. Ramakrishnan, (3) Navakote.

# COLLEGE DAY SPORTS

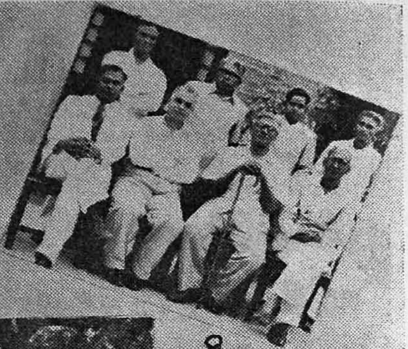


1. March past of the Competitors. 2. Hurdles 110 meters. 3. Ladies race. Lime and spoon. 4. Javelin throw. 5. Start of 100 meters dash. 6. Obstacles race. Tackling the lemons. 7. Pole vault. 8. High jump. 9. Elders competition — tailing the elephant. 10. Victory stand. Winners in the lime and spoon race. 11. The Director of Agriculture giving away the Championship cup to M. Marappan. *(Photos courtesy of Stephen Dorairaj and P. N. Sundaraswamy).*

# COLLEGE DAY CONFERENCE



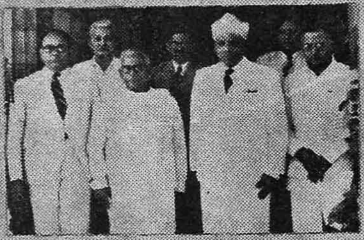
1



8

3

2



4

7

5

6

1. College portico decorated. 2. Guard of Honour by the students. 3. Farmers' Day Celebration. 4. Centenary Celebration left to right: Director of Agriculture, Principal, Minister for Agriculture, Deputy Secretary, Government of Madras, Vice-Chancellor, University of Madras, Systematic Botanist and Professor of Botany, and Head-quarters Deputy Director of Agriculture (Engineering), 5, 6 and 7. Exhibits of the College Day, 8. Managing Committee: Sitting – A. M. Kulandai, N. Krishnaswamy, M. R. Balakrishnan, C. S. Krishnaswamy. Standing – Varisai Muhamad, T. S. Lakshmanan, M. V. Jayaraman, N. Ranganathachari.

11. 400 METRES RACE (PRINCE OF WALES CUP (56 4/5 sec. New record). (1) Marappan, (2) T. L. Subramaniam, (3) Premnath Alwa. 12. JAVELIN THROW (102 ft. 2 in.) (1) G. C. Perumal, (2) P. Shivaram Rai, (3) W. O. Omamo. 13. 1,500 METRES RACE (1 Mile Race) (5 min. 2 1/5 sec.) (1) N. K. Periaswami, (2) Meenakshisundaram, (3) Kadambavana Sundaram. 14. STAFF RACE (100 Yds. Race (10 2/5 sec.) (1) Ratnam, (2) Chandi, (3) Shetty. 15. OBSTACLE RACE (1) S. Sankaran, (2) Abdul Latif, (3) Perumal Raja. 16. DISCUS THROW (79 ft. 2 in. New record) (1) G. C. Perumal, (2) W. O. Omamo, (3) D. V. Viswanath. 17. 200 METRES (25 sec.) (1) Marappan, (2) G. A. Sivaraman, (3) Premnath Alwa. 18. OLD BOYS COMPETITION (Tailing the Elephant) (1) M. R. Balakrishnan, (2) M. A. Sankara Iyer, (3) Raman Menon. 19. WOMENS' RACE (Lime and Spoon Race) (Women only) (1) Miss Sukanya Bai, (2) Miss Savithri. 20. HAMMER THROW (70 ft. 6 1/2 in.) (1) W. O. Omamo, (2) Dharmaratnam, (3) S. Sankaran. 21. TREASURE HUNT (1) Kandaswami Gounder, II year, (2) Surendran Bhagavathiappan (Tie). INTERWARD TUG OF WAR (1) S. M. Kalyanaraman, (2) S. Reddy. INTERWARD RELAY RACE (1) Entomologist, (2) A. H. S. Sarma, (3) Civil Engineer. CHAMPIONSHIP CUP Sri K. Marappan.

---

## EXTRACTS AND GLEANINGS

**Chinese Science Revisited (2). Dr. Joseph Needham, F. R. S. Nature Vol. 171 : No. 4346, 14th February 1953, Page 283 - 85 :** At the end of the last article there was mention of geological survey parties — eighty-three of these were in the field during 1951. But the Geologists have also given essential service in the physiotopographical surveys of areas where railway construction and river conservancy work are progressing. Without them the Lunghai railhead would not have reached Lanchow ten months ahead of schedule, as it did ; without them the astonishing progress could not have been made with the Huai River Project. In this scheme, which will solve the problem of a great river (between the Yangtze and Huang Ho) for generations to come, sixteen large retention-basin dams are being constructed on the upper tributaries in the provinces of Honan and Anhui. Some are already finished and the whole project will be at least on the scale of the famed Tennessee Valley Authority.

In other cases, parties of scientific men of very varied specialities have taken the field. For example, a party of no less than fifty experts proceeded to Lhasa to see what could be done to assist the Tibetans in improving their condition of life. This group included agronomists, soil scientists, geologists, geographers, meteorologists, sanitary engineers and medical men, ethnologists (for example, Li An-Che) and historians. Another large party, including gynaecologists and child welfare experts, visited the minority peoples of Sinkiang.

The current emphasis on practical tasks can be seen in all fields. In some, the results produced can be spectacular. The cotton aphid (*Aphis gossypii.* Glover) has long been a great pest in the cotton growing regions of southern Hopei and the newly formed province of P'ing-Yuan. But its life-cycle was not well understood. After several months of travel and research in the regions concerned, Chu Hung-Fu and his colleagues of Academia Sinica were able to ascertain that this aphid passes the winter attached underground to the roots of a common weed *Lactuca* or *Ixeris chinensis versicolor.* It is now possible, therefore, to eradicate it almost completely ; this is all the more important a discovery because the pest is rather resistant to known insecticides. While I was visiting the Academy's Entomological Laboratory, reports came in of the first successful large-scale use

(1951) of gamma benzene hexachloride against locusts, spread from aeroplanes in southern Hopei and Anhui. Many of the new substances for insect control, such as E, 605, 666, 'Gammexane', etc., are now made in China.

As for the emphasis on teaching, it can be seen in all fields. For the time being, research is concentrated rather in the institutes and laboratories of Academy, though it goes on to a minor extent in university laboratories; this is regarded as a passing phase, for the general principle that the latter should also be active research schools is fully admitted. Planned expansion in geology, for example, is remarkable – where there were 35 students in 1951, there were 120 last year, and for this year 1,000 are being planned for. The Medical College of Peking University, and the National Medical College at Shenyang (Mukden), formed by the additional absorption of the former Scottish and Japanese schools, are indeed impressive in their size and vitality. According to Dr. Hu Chuan-Kuei, principal of the Peking University Medical College, which has forty years of history, the student numbers rose from 400 in Komintang times to 1,400 at the present day. This includes 260 students in pharmacy, 160 in dentistry, 140 in public health, 40 in nursing and 40 in midwifery. The total number of qualified medical men in China is of the order of 50,000; but ten times this number are urgently needed to give one per thousand of the population. Of the 2,300 hsien cities in China, however, already more than 1,800 have their own State clinic or hospital. Besides the mobilisation of old-style practitioners as auxiliaries, already mentioned, there has been a cutting down of the total time needed to qualify. The full qualification will still take five years; but medical assistants are being turned out after a two-year course, and technicians of various kinds need even less. The compression of the curriculum has been done by omission of matters which are unlikely to be met with by Chinese medical man, for example, the tropical diseases of South America. All teaching is now done in the Chinese language.

Both for research and teaching. Chinese scientific workers now have facilities incomparably greater than those which used to be available during the confusion and blockade of the Second World War. A great many instruments are now being made in the big cities such as Shanghai. In Academia Sinica laboratories, I saw excellent incubators and refrigerators, a variable-temperature insect-behaviour chamber, vacuum pumps, mechanical stirrers, shaking machines, ball mills and glassware, all made in China. A kind of 'Pyrex' ware is also locally available. Microtomes have been constructed by the Chinese Union Medical College workshops. At the Shenyang Medical School a consignment of two hundred teaching microscopes from East Germany had just come in during one of my visits, and my friends in the National Academy were making much use of East German catalogues. If normal conditions of trade can be restored, as all must hope, China would doubtless be glad to receive British scientific instruments. Heavier kinds of equipment are often Soviet in origin, and the Chinese are making excellent use of them.

Another emphasis which must be mentioned is that on popular education. There is a touching and genuine thirst for scientific knowledge among the Chinese people. Shops which sell anatomical models and geological charts have a crowd around the windows all day. If the visitors from the West wanders into one of the modern bookshops on Sunday, he will almost have to step over rows of children and boys and girls of various ages sitting on the floor and against the book cases reading popular science, and not paying the slightest attention to him. The assistants never insist on readers buying books, though they usually do, as they are relatively extremely cheap. I visited a popular exhibition of astronomy in the beautiful Pei Hai Park in Peking. It was packed with ordinary people, to say nothing of the usual large proportion of school-children, who were delighted with simple form of planetarium. Most justifiably there were special panels

accurately relating the ancient and medieval contributions of the Chinese to astronomy, such as the invention of the equatorial mounting by Kuo Shou-Ching in A. D. 1279; and the young man who was demonstrating these was delighted that a Western visitor was already familiar with these contributions and could even elaborate on them. Of great interest also was an exhibition of army education set up in the buildings surrounding the exquisite Temple of Heaven; here there were many pieces of simply constructed apparatus for demonstrating fundamental principles of physics, optics and the like; or, to take another example, out-patients passing through the corridors at China Union Medical College would pause to look at illuminated model scenes inset into the walls, which explain the cycles of transmission of the chief helminthic infections known in the Chinese countryside. Will it not make some difference to the world that five hundred million people are awakening to the significance of natural science and all that that implies?

Next, something may be said of a few of the researches which have been proceeding during the past three years. Stimulated by the importance of ethyl mercury chloride as a fungicide, the Institute of Physical Chemistry of the Academy has been studying the role of catalysts in the formation of this and similar compounds. The Institute of Organic Chemistry has been working on plant hormones and possible new antibiotics derived from certain plants traditionally used in Chinese medicine. From the point of view of economy it would obviously be of advantage to use as many of these as possible, and they are now undergoing more extensive study by modern methods than ever before; the China University Medical College, for example, has a special department for the investigation of Chinese materia medica. In physiology there has been work on micro-analysis of potassium, sodium and phosphorus in nerve tissue during activity. The Laboratory of Developmental Physiology has completed researches on the structure and mode of action of the eye-stalk hormone of Crustacea, and has isolated an active substance in the form of its cadmium complex. Systematic botany and zoology are being actively pursued by many workers; often in connexion with important practical problems, such as forestry, fisheries, and the epidemiology of rodent-borne plague. Important work has been done by the Metallurigical Institute on new kinds of nodular graphite cast iron with superior strength and properties favourable to mechanical treatment. Its Kunming branch laboratory has been occupied with problems relating to the bauxite deposits of Yunnan province, and similar local needs. In so short a review as this it is, of course, impossible to do more than allude to a few of the subjects on which research is proceeding.

In conclusion, a few words may be said regarding the philosophical point of view of Chinese science to-day. In accordance with the world-outlook which has triumphed in China, Chinese scientists are greatly interested in dialectical materialism. The fact that there is very little opposition to it is noteworthy, and arises from several causes. There was never any strong strain of metaphysical idealism, such as that represented by Eddingtonian views, in Chinese thought. On the contrary, its finest formulation by the school of Chu Hsi in the Sung dynasty (twelfth century A. D.) was remarkably congruent with dialectical materialism, for this school worked with but two concepts: *ch'i*, matter, including its most tenuous forms, and *li*, the pattern or organization of things. These patterns were explicitly recognized to be arranged in levels of organization. For this world picture dialectical materialism may readily be considered a continuation. In other words, the age-old and refined conceptions of Chinese humanism are fusing with dialectical materialism without that stress and strain felt in a Europe which has so long been the battlefield of irreconcilable opposites—either theological spiritualism, or atoms and the void.

# Weather Review — For the month of July, 1954.

RAINFALL DATA (IN INCHES)

| Division | Station | Total rainfall for the month | Departure from normal | Total since 1st January | Division | Station | Total for the month | Departure from normal | Total since 1st January |
|---|---|---|---|---|---|---|---|---|---|
| North | Madras (Meenambakkam) | 10·5 | + 6 9 | 14·1 | South | Madurai | 1·4 | — 0·6 | 13·5 |
| | Tirurkuppam* | 9·6 | + 5·2 | 13·7 | | Pamban | 0·3 | — 0·2 | 12·0 |
| | Vellore | 8·9 | + 4·3 | 16·0 | | Koilpatti* | 1·0 | + 0·4 | 19·2 |
| | Gudiyatham* | 15·5 | +12·1 | 21·6 | | Palayamcottai | Nil | — 0·3 | 10·5 |
| | | | | | | Ambasamudram* | — | — | — |
| East Coast | Palur* | 8·8 | + 5·3 | 16·4 | West Coast | Trivandrum | 5·7 | — 2·1 | 35·7 |
| | Tindivanam* | 11·1 | + 7·4 | 19·8 | | Fort Cochin | 18·7 | — 4·6 | 83·4 |
| | Cuddalore | 4·0 | + 1·4 | 19·0 | | Kozhikode | 30·2 | — 4·1 | 105·0 |
| | Nagapattinam | 4·7 | + 3·0 | 11·9 | | Pattambi* | 24·2 | — 0 9 | 64·4 |
| | Aduturai* | 1·6 | — 0 5 | 11·7 | | Taliparamba* | 49·1 | + 4 0 | 108·8 |
| | Pattukottai* | 2 8 | — 1·1 | 19·3 | | Wynaad* | 21·1 | — 1·5 | 50 8 |
| | | | | | | Nileshwar* | 51·7 | + 5·8 | 126·4 |
| | | | | | | Pilicode* | 46·9 | + 3 6 | 113·8 |
| Central | Salem | 5·4 | + 1·6 | 17·1 | | Mangalore | 46·2 | + 6·8 | 102·8 |
| | Coimbatore (A. M. O.)* | 1·8 | — 0·3 | 13·7 | | Kankanady* | 47·2 | + 3·5 | 102·1 |
| | Coimbatore | 1·5 | — 0·2 | 16·7 | Hills | Kodaikanal | 6·2 | + 1·5 | 35·2 |
| | Tiruchirapalli | 1·6 | + 0·5 | 12·9 | | Coonoor* | 1·1 | — 2·4 | 30·2 |
| | | | | | | Ootacamund* | 6·1 | — 1·2 | 21·4 |
| | | | | | | Nanjanad* | 15·1 | + 3·8 | 31·6 |

*Note*:—1. * Meteorological Stations of the Madras Agric. Dept.

On the first day of the month the monsoon was weak along the West Coast. On the next day it became vigorous, particularly north of Cochin. Widespread rains were received till 8-7-1954 along the West Coast with a few localised light to moderate showers in different parts of Tamilnad. On 9-7-1954 the monsoon became slightly weak along the West Coast and remained so for four days. On 13-7-1954 it became definitely weak in Malabar and South Kanara. Again it gained strength on 15-7-1954 and retained it for a week. During this period light to moderate rains were received in different parts of Tamilnad. A Temporary break in the monsoon was noted throughout the country on 22-7-1954 and it persisted for three days. On 25-7-1954 the monsoon revived and continued to be so till the end of month with mild changes in vigor even along the West Coast. Localised light rains were received in different parts of Tamilnad in the last week of the month. The note-worthy rainfalls and the zonal rainfall for the month are furnished hereunder :—

**Note-worthy Rainfalls for the Month**

| Date | Name of Place | Rainfall | Name of Zone | Av. rainfall for July | Dep. from normal | Remarks |
|---|---|---|---|---|---|---|
| 1/7/54 | Kallakurichi | 3·0″ | North | 11·1 | + 7·1 | Far above normal |
| 5, 18 & 23/7/54 | Mangalore | 4·0″ | East Coast | 5·5 | + 2·6 | ,, |
| 6/7/54 | Mercara | 10·0″ | Central | 2·6 | + 0·4 | Above normal |
| ,, | Palghat | 4·1″ | South | — | — | — |
| 17/7/54 | Calicut | 4 0″ | West Coast | 34·1 | + 1·1 | Above normal |
| 24/7/54 | Madras (Nungambakkam) | 3·0″ | Hills | 7·1 | + 0·4 | Just above normal |

Agricultural Meteorology Section,
Lawley Road P. O.,
Coimbatore, 12—8—1954

C. B. M. & M. V. J.

## DEPARTMENTAL NOTIFICATION

### Gazetted Service—Posting and Transfers

| Name | From | To |
|---|---|---|
| Krishnamurthy, K. S. | On leave | Spl. D. A. O. Crop Sampling Tanjore |
| Krishnaswami, C. S. | P. P. O. Coimbatore | To be in additional charge as Govt. Mycologist |
| Narayanan, N. G. | Asst. Cotton Specialist, Srivilliputheor | Gazetted Asst. to Cotton Certification Officer, Rajapalayam |
| Ramaswami Mudaliar, V. | On leave | Asst. Cotton Specialist, Srivilliputhoor |
| Rajaratnam Chetty, S. | On deputation to Mysore Govt. | Spl. D. A. O. Crop Sampling, Salem |
| Radhakrishnan, T. | Asst. Agrl. Eng. Office of the D. A. Madras | Asst. Agrl. Eng. (Civil) Agrl. College, Coimbatore |

### Upper Subordinates—Posting and Transfers

| Name | From | To |
|---|---|---|
| Anantanarayanan, K. K. | F. M. Wynad | A. D. Gudalore |
| Balasubramaniam, R. | Asst. in Tuber, Coimbatore | S. D. A. Madurai |
| Dorairaj Ratnam | A. A. D. Vilathikulam | Spl. A. D. Srivaikuntam |
| Edwin Mangala Dass | Asst. Botanical Garden, Ootacamund | Spl. A. D. Sugarcane, Villupuram |
| Gopalakrishnan, P. K. | Horticultural Trainee | F. M. Fruit Asst. Wynad |
| Gopinathan Nair, K. V. | A. D. Gudalore | Spl. A. D. Sugarcane' Vellore |
| Govindaswami, G. V. | Asst. Mycologist, Ootacamund | Asst. in Mycology, Coimbatore |
| Herbert Adisesiah | On leave | F. M. Central Farm, Coimbatore |
| John Knight, S. | Horticultural Trainee | A. D. North Arcot |
| Karuppanan, P. M. | do. do. | A. D. Salem |
| Kanniappan, R. | Fruit Asst. Kallar | A. D. Namakal |
| Krishna Alwa, H. | A. A. D. Balthangadi | P. P. A. Mycology, Balthangadi |
| Kannian, K. | Cotton Asst. Coimbatore | Cotton Certification Inspector, Rajapalayam |
| Lingannan, | A. D. Tiruvengadu | A. D. Tirumani Leprosy Sanitorium, Chingleput |
| Lakshmanan, V. | Horticultural Trainee | Spl. A. D. Cotton, Srivilliputhoor |
| Mahalingam, M. | do. do. | Potato Asst. Nanjanad |
| Madhavachari, R. | Marketing Asst. Civil Supply, Vijayawada | Marketing Asst. Supply, Tanjore |
| Mamoo Koya, P. K. | Spl. A. D. Tinnevelly | A. A. D. Gangaikontan |

| Name | From | To |
|---|---|---|
| Madhava Rao, S. | Asst. Botanical Garden, Ootacamund | Asst. Botanical Gardens, Coimbatore |
| Madhava Pillai | A. D. Arni | A. A. D. Vedasandur |
| Nallagounder, S. C. | F. M. Central Farm, Coimbatore | Extension Officer in Agriculture Krishnagiri Block |
| Ponniah, S. | A. A. D. Gangaikondan | Spl. A. D. Tinnevelly |
| Perumal, A. S. | Horticultural Trainee | A. D. Sankarankoil |
| Parameswaran Namboodiri | Spl. A. D. Srivaikuntam | A. A. D. Vilathikulam |
| Purushotham, P. S. | A. D. Chidambaram | A. D. Coimbatore |
| Peter, S. D. | Cotton Asst. Periakulam | Cotton Certification Inspector, Rajapalayam |
| Rajagopalan, C. K. | Horticultural Trainee | Pulses Asst. Tirupathoor |
| Rajaraman, N. S. | do. do. | A. D. Lalgudi |
| Robinson, L. | Cotton Asst. Coimbatore | Cotton Asst. Tiruchengode |
| Ramakrishnan, V. | Asst. Botanical Gardens, Coimbatore | Asst. Botanical Gardens, Ootacamund |
| Raghavan, N. | P. P. A. (Myco.) Ootacamund | do. do. |
| Radhakrishna Rao, K. | Horticultural Instructor, Coimbatore | Cotton Asst. Coimbatore |
| Sachidanandam, | Horticultural Trainee | A. D. Tiruchengode |
| Seshadri, V. S. | do. do. | Asst. Tuber crops, Coimbatore |
| Subramaniam, P. T. | do. do. | Fruit Asst. Kallar |
| Sethumadhavan, P. | Potato Asst. Nanjanad | Asst. in Ento. Coimbatore |
| Sadashiva Reddy, Y. | A. D. Koondapur | A. D. Karkal |
| Sarma, V. R. | A. A. D. Buntwal | A. A. D. Balthangadi |
| Yeswanth Ail | Horticultural Trainee | Asst. Cashew Scheme Mangalore |
| Venkataraya Pai | P. P. A. (Ent.) Mangalore | A. D. Udipi |
| Vittal Hegde | A. D. Udipi | A. D. Coondapur |